ELECTRICAL REVIEW

31st JULY, 1953

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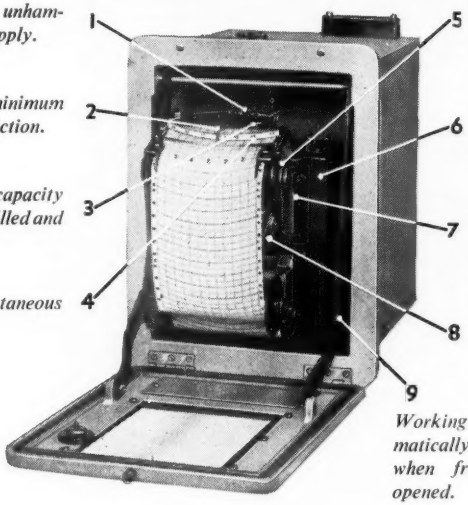

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ELECTRICAL REVIEW 31st JULY, 1953

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Simplify and Standardize

THE importance of a much greater degree of standardization than at present exists was brought out more than once at the Torquay Convention. One author pointed out that the design of a substation cannot be completed until the working drawings of the switchgear have been received; and since it usually takes longer to build the substation than to manufacture the gear, much inconvenience is caused to all concerned. Not only is the starting-up of the substation delayed, but the manufacturer has to accommodate the completed gear, either by providing warehouse accommodation, or by allowing his shop floor space to be occupied and his capacity for output reduced. One would have supposed that by this time any firm's designs would have been sufficiently standardized for dimensions to be known closely enough to provide foundations and to allow for cable runs.

The same author offers the wise suggestion of running portable tools from 110 V, with midpoint earthed, so that live metal is never at more than 55 V above earth; and, to avoid the risk of plugging such appliances into 220 V circuits, he advocates the desirability of restricting the application of " one of the many standards for plugs and sockets " to 110 V. There certainly are a lot of alleged standards, with different pins and different dimensions. Some think that when a standard is proposed it must be different from anything in use, so that all start with the same disadvantage, but the result is often more than a little awkward for the consumer.

In the discussion, a maker of motor control gear said that, in spite of years spent on attempts to standardize, orders were all different, *even when they were repeats!* Diagrams had to be made afresh for almost every occasion. He advised standardizing a limited variety of relay and control circuits. Could not more be done in the direction of agreeing on the room required for different equipment? The shape and size of substations could be standardized. Much modern substation gear stands on the floor—switch

cubicles, transformers, rectifiers, capacitors—and most of it can be rolled on bars, so avoiding the expense of rollers. Much progress has been and is being made in the simplification of requirements and the standardization of construction; but still more remains to be done. The work is urgent, for it helps to overtake the plant shortage, and it is very likely that what is found good at home will prove attractive in the export market.

WINTER POWER PROSPECTS

Once again the shortage of house coal has been put forward as a reason for restrictions on electricity supply. Mr. Nabarro's question to the Minister of Labour last week referring to householders resorting " promiscuously " to the use of electric fires and water heaters carried the implication that this was undesirable, whereas in fact greater use is thereby made of the inferior grades of fuel at the expense of the higher qualities that are scarce. Sir Walter Monckton, in his reply, spoke of the welcome improvement in the electricity position and announced that it was not proposed to set a national load spreading target next winter, but that Regional Boards for Industry would have discretion to make arrangements in their own areas in the light of conditions likely to arise.

BELFAST DECISION

The decision of the Belfast Corporation Electricity Committee to adhere to the contracts for power plant originally placed (which was confirmed by the City Council this week) will receive general approval. Describing it as " the wisest course," the *Belfast Telegraph* adds that for the future all concerned should bear in mind the constant need for the observance of the most competitive conditions. With this we wholly concur. Normally, open tenders are desirable, but in this instance, on the advice of its consulting engineers, the Committee had obtained quotations from selected manufacturers in order to expedite the work in view of the risk of load shedding. To have advertised for tenders after that would have been a breach of good faith and would have resulted in the delay that it was desired to avoid.

THE G.E.C. REPORT

The steep fall in the sales of consumer goods both at home and abroad, reference to which was made in last year's report of the General Electric Co., Ltd., continued during the past year, and was largely responsible for the decrease in the company's profit for 1952–53, although its turnover showed a considerable improvement. A lower rate of gross profit was another factor. Against this, output of capital goods during the year was a record. The report, however, sounds a note of warning. Shortage of finance the world over and increased competition tend to make the outlook for capital goods less favourable. Fortunately there are indications that the fall in orders for consumer goods has stopped and there are slight signs of improvement.

EXPORT COMPETITION

Although rather better than the average for manufactured products as a whole, exports of electrical products during the first half of this year fell by nearly 9 per cent. After the post-war record of continuous progress, this decline cannot be regarded with complacency even though there are indications that manufacturers are succeeding to some extent in making good their diminished trade in hitherto valuable markets by their enterprise in developing new spheres of activity. As Mr. Butler stated last week, we are now entering on a phase of intense competition. We are meeting it for the first time since 1939 and we have to learn to regard it as normal. Never was it more essential than at present to redouble our efforts to expand our overseas markets.

Electricity in the Farmhouse

Sales Approach Through the Farmer's Wife

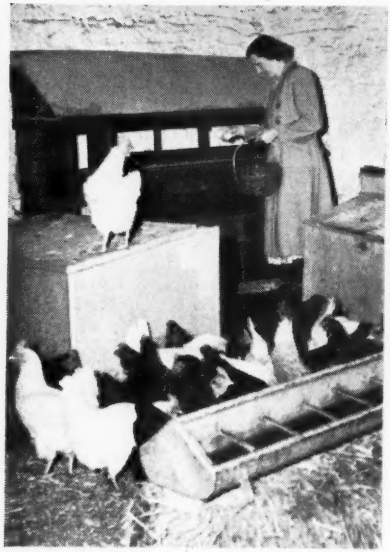
By W. J. GUSCOTT, M.I.E.E., A.M.I.B.A.E.*

THE prominence given to rural electrification in the papers and discussions at the British Electrical Power Convention in Torquay in June could not have failed to emphasize the importance and true place of electricity in the farmhouse and cottage. One needs only to study the report in " Hansard " of a debate on the same subject in the House of Commons on 19th June to find the requirements of the farmer's wife, his family and the womenfolk of his employees most strongly and repeatedly featured. All sides of the House accepted the case submitted for the speeding up of the rate of bringing electricity supplies to the thinly populated rural areas which have been so long denied the amenities enjoyed by the townspeople.

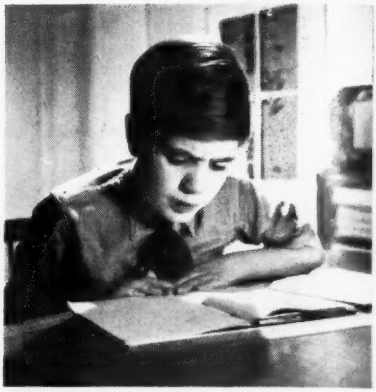
No matter on what general grounds the appeal for more electricity in the countryside is made, the appeal of " Mrs. Farmer " and " Mrs. Cottager " and their associates in the Women's Institutes is widely in evidence. Be it in the undoubted claims that electricity arrests the drift from the country to town, that it halves the work and time spent in the house or dairy, or that in reducing overtime it gives the farmer and his men more time at home, the interests of the womenfolk continuously emerge.

How many wives, having started the ball rolling towards getting a supply of electricity, have persuaded a hesitant farmer " over the brink " during negotiations? Feminine methods vary. Sometimes the deciding factor is a threat to help less on the farm unless offered material assistance of electricity in the house. Often, an offer to pay all or part of a contribution from the " egg money " has succeeded, and cases have been known where the decision turned on mother's plea that the children's backwardness at school was caused by eyestrain through doing homework in inadequate lighting. Combine the home benefits of electricity with

* Assistant Chief Commercial Officer (Development), South Western Electricity Board.



Electricity frees the farmer's wife from much hard work in the home and gives her time to produce the "egg money!"



Doing homework like this with book in shadow and eyes strained can be avoided by installing electric lighting

those brought to the business part of the farm—the higher efficiency at lower cost, the release of skilled field workers from the bondage of byre and barn, the improvement obtainable in working conditions—and the case for faster rural electrification is made beyond all possible doubt.

The need for specially trained salesmen to convince potential rural consumers has always been apparent, but to-day it is even more pressing. The release by the Government of more capital for rural extensions and the removal of the ban on full promotional activity is an encouragement to rural Boards, but real progress will continue to depend to a very large extent on the availability of Boards' representatives and their ability to "sell" the advantages of electricity on the spot. Because of the high capital cost per consumer of providing a rural network, every possible consumer must be encouraged to join in schemes and persuaded to make the optimum use of the supply when connected.

The woman's point of view demands to be taken fully into account in the thought which Boards, in order to make the most of this revival, will be giving to sales approach. Rural selling, although basically similar to all selling, needs a special technique. Few will dispute the view submitted and implied throughout this article that, in reaching the ultimate and most necessary aim of rural Boards to have every farmer making the maximum use of electrical energy for business purposes, the course is likely to be quicker and smoother if the farmer's outlook is first conditioned to the real advantages of electricity by his recognition of them in his home.

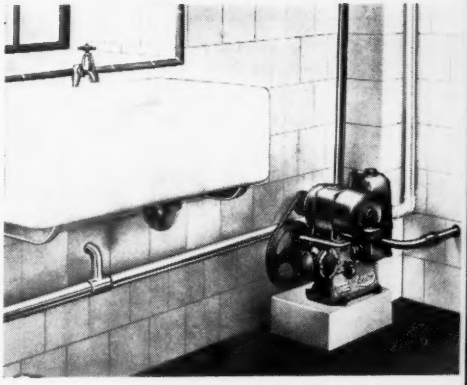
How are the womenfolk first and best sold the idea? What are the arguments likely to convince them? In what applications of electricity and in what fields will they and their families discover the greatest and most material advantage? Many of the benefits of use, whether in town or country, are common in all changes to electricity from the older forms of service: better lighting, cleaner kitchens, simpler cooking for instance, but no salesman needs to be reminded of these. There are advantages of electricity in the home, however, which, although also enjoyed in the town, mean infinitely more to the wives of the farmers and the women of the countryside, where the standards are so much lower than in the town.

Unbelievably primitive conditions still exist in many country districts even in these modern days. Take water, for example, so readily available as piped supplies in the towns. Often in farmhouses, where the demand is unusually high, every

drop has to be pumped by hand and carried in buckets and pails for use in the home, where it becomes tepid and dusty before it is used. An imaginative salesman conscious of this contrast should virtually find his task half accomplished, for few farmers' wives could fail to react favourably to any proposals which, with the aid of a simple piece of apparatus—an electric pump—would bring cool, clean, piped water right to the point of use.

Similarly, where other than in a farmhouse or farm cottage can there be a greater and more justifiable demand for constant hot water to clean up and refresh the men, dusty, mud-caked or manured, according to the season or task, or to settle down the children exhausted after a day in the hay or cornfield?

Despite willingness to pay for it, daily help in the farmhouse is not so easily come by as in the towns. Yet it is the old-fashioned kitchen ranges that cause the extra work, make the dust fly, try the tempers, blacken the pans and heat the kitchens to unbearable limits while demanding almost continuous attention. What a boon the modern clean and fumeless electric cooker must be in such cases. Is there a salesman who, armed with pointers like this, could fail to use them to step up his turnover in the rural areas? Even the modern solid fuel cookers demand the handling and carrying of coal, create dust and make kitchens hot in the summer months.



Water to the kitchen sink: no more fetching and carrying

Farmers and their families, who are invariably realistic in outlook, with the help of an enthusiastic salesman, are usually quick in realizing that the wires that bring their light and radio also bring energy for

No more fires to light for hot water and (right) no salesman needs reminding about the advantages of electric cooking

cooking and heating and that to transport solid fuel over miles of countryside to the farm which has an electricity supply is uneconomic.

Perishable foodstuffs produced on the farm or bought once a week, or even less frequently in the markets, create a demand in the farmhouse for safe storage. Is there a clearer field than this for the salesman who can talk refrigeration, who can in one fell swoop promise a cool niche for the joint or game, ice cream for the "nippers," cool beer for the "boss," and, above all, who can put "Mrs. Farmer" on equal terms with "Mrs. Townswoman"?

Clothes used for country work cannot fail to get considerably dirtier than do those of the "collar and tie" workers of the towns. Even if laundry charges were back to pre-war levels and remote farms could enjoy the frequency of town collection and delivery, most homely country women seem proudly to prefer to handle the weekly wash themselves. The electric washing machine provides the opportunity at much reduced effort and remarkably low cost. Home laundry completed with smooth electric ironing rounds off the picture and converts the drudgery into a labour of love.

In towns, most people at least have gas available for lighting even if they have not become really modern, and, in spite of the many failings of gas, it has much to commend it over the oil lighting and candles used in the countryside. This again makes the rural wife fair game for the salesman who studies the facts—has perhaps himself tried to trim a few smelly lamps—and can compare the practical disadvantages and cost of the older methods with the new.

Big, badly lit kitchens offer special scope for the introduction of shadowless fluorescent lighting, which is ideal for bringing to the notice of the farmer how useful such new lighting would be to him in his farm buildings.

Sales representatives, of course, are always well acquainted with the working costs of electrical appliances. In rural areas a ready knowledge of the weekly budget of a country home struggling valiantly along without electricity is a potent weapon if properly used by the attacking sales force.

The farmer's milking coat goes into the washing machine and (right) the electric sewing machine completes the home laundry in the farmhouse

Country Cottage

Weekly Costs Using Electricity	*Per week*	*Costs Using Other Methods*	*Per week*
Electricity for lighting, cooking, radio and ironing.		*Cooking*	s d
60 @ 5d		2¼ gal paraffin	4 11
60 @ 2d		*Lighting*	
380 @ ¼d		1 gal paraffin	1 11½
	s d	½ lb candles	8½
500 kWh at £3 2s 8d per quarter =	4 10	Matches	4
Line rental payment, £3 per annum =	1 2	*Radio*	
		Accumulator charging	8
		H.t. battery	
		3 per year at 15s 0d	11
	6 0		9 6

Saving per week is 3s 6d or £9 2s 0d per annum.

Small Village House

Costs Using Electricity	*Per week*	*Pre-electricity Costs*	*Per week*
	s d		s d
Electricity for lighting, cooking, radio, ironing, bedroom fire		*Cooking*	
412 kWh per quarter	4 2	1 cwt coal	4 11½
Standing charge 16s 3d per quarter	1 3	*Lighting and Primus, etc.*	
Hire of cooker	7	2 gal paraffin	4 0
		Candles	7
		Methylated spirit (¼ pint)	4
		Radio	
		Battery charging	8
		H.t. and g.b. batteries 12s 3d and 2s 11d every quarter	1 1½
	6 0		11 8

Saving per week is 5s 8d or £14 14s 0d per annum.

Prospective consumers can often be reminded profitably that the obsolete methods they are being urged to discard in favour of electricity are already costing infinitely more to run, to say nothing of their being far less efficient.

The tabulated figures were obtained from independent sources and show actual pre-electricity costs with those after a small village had received a supply. It is true that they make no allowance for capital spent on electrical appliances and house wiring, both of which admittedly are considerable items at first sight and until it is realized that the running weekly saving on the change-over will go a long way towards bearing the interest charges on hire purchase. In any case, the depreciation costs of electrical appliances and particularly of wiring installations (if not provided by the landlord) are very small as a result of the long life that can be confidently expected from them. In the bigger houses and farms there would be a similar, and perhaps greater, saving.

If this article has shown the value of electricity to the countrywoman, proved the wisdom of reaching the farmer's heart or his cheque book through his womenfolk, and given a line of approach to salesmen who will be let loose on this profitable ground, it will have served its purpose. In the electrical world there is an agricultural revival—how far it will be successful in bringing the benefits of electricity to many more consumers and new remunerative business to the Boards will depend to a large extent on the skill of the salesman or agricultural representative on the spot.

Farmers' wives have little time or inclination to study the papers or read letters and pamphlets. As with the farmer himself, the spoken word is worth masses of literature. It is important to free the salesman a little from the bondage of conventional approach and allow him to deal with his customers as though they really *are* his customers and to sell to them not only in their environment but if necessary in their time.

Analysers and Computers

Vacation School at Imperial College

A VACATION school on analysers and computers for electrical systems was held recently in the Electrical Engineering Department of Imperial College, London University. It was attended by 60 engineers from industry, the B.E.A., research associations, technical colleges and the universities. The purpose was to encourage the wider use by electrical engineers of analysers and computers for solving the problems that arise in connection with machines, control systems and power networks.

The opening address was given by Mr. F. J. Lane (B.E.A.), who emphasized the value of vacation schools and referred to the continuing development of more accurate methods of calculating the design and performance of electrical systems.

In the first lecture, Mr. B. Adkins (Imperial College) described the course as an opportunity for electrical engineers to review recent improvements in the methods available for the solution of numerical problems with the aid of computers, analysers and models. He went on to discuss electrical machine problems, grouping these as design and performance calculations, each group comprising routine calculations and research investigations, and showed some examples of each type.

In the following lecture, Dr. J. R. Mortlock (B.T.H.) introduced some of the more common problems met in the design of power systems, showing the types of equation encountered in each and the usual methods of solving them.

Closed-Loop Control Systems

The third lecture, by Dr. J. H. Westcott (Imperial College), dealt with the design of closed-loop control systems. After discussing steady-state calculations and graphical methods using harmonic responses he surveyed the methods of estimating transient response and made suggestions for applying more comprehensive criteria to the performance, and hence design, of control systems.

Dr. W. J. Gibbs (B.T.H.) showed that problems first require formulation by the specification of an ideal system which could be represented in mathematical terms, and then reviewed the types of calculation often required. He demonstrated that matrices could assist the orderly arrangement and manipulation of performance equations of all types of system. The remaining lectures dealt with methods of solving equations of the types described by Dr. Gibbs.

Semi-Automatic Machines

In a lecture on systematic computation, Mr. M. W. Humphrey Davies (Imperial College) put forward suggestions for processes intermediate between simple slide-rule calculations and the complex methods used in automatic computers. After surveying existing types of band-operated calculating machines, he demonstrated a convenient method for the solution of sets of linear simultaneous equations, and described an improved type of semi-automatic machine designed for handling two-dimensional quantities that is being constructed at Imperial College. He concluded by suggesting that semi-automatic machines might be specially suitable for many routine calculations.

During the course members of the school visited the Imperial College laboratories and saw the automatic digital computers constructed by Dr. Tocher in the Mathematics Department and a transformer-analogue analyser, a semi-automatic decimal computer for complex quantities and other analogue devices in the Electrical Engineering Department. A visit was also paid to the N.P.L. to see the automatic computer, A.C.E., the analogue differential analyser and the punched-card tabulating equipment in the Mathematics Divisions and an analogue device for the design of control systems in the servomechanisms laboratory.

Dr. J. M. Bennett (Ferranti) described several types of automatic digital computer

and discussed the advantages of their rapidity and accuracy in dealing with different types of engineering problems. Mr. L. Gosland (E.R.A.), in a lecture on analogue analysers, made an extensive survey of analogue computers, network analysers, models and simulators, giving examples of their application to practical problems.

The final lecture, by Dr. G. E. Slemon (Imperial College), was concerned with the solution of non-linear problems, being confined to the two methods of considerable generality, namely, numerical or step-by-step methods, and approximate steady-state methods using modified linear techniques. Finite difference methods were described for the solution of first-order, simultaneous and higher-order differential equations with variable parameters. Dr. Slemon then explained his "fundamental frequency" approach to steady-state non-linear circuits, and showed how this could be applied to both power-frequency and stability problems. Finally, adaptations of mathematical, graphical and other techniques for use with the fundamental-frequency method were surveyed.

The discussions that followed the lectures, and the general discussion at the end of the course, indicated that there would be a considerable demand for the facilities of automatic computing machines as they became available and that there was scope for improvements in desk machines. It was felt that a desk computer with a trained operator would be a useful adjunct to many engineering offices, but that analogue rather than digital devices would often be preferred by engineers, because explicit mathematical formulation of the problem was unnecessary, and because such devices were frequently analogous to the physical system, with the added advantage in power network and similar problems that the general behaviour of the system could be observed directly. Such devices made it possible for the engineer to solve his own problems with only occasional assistance from a mathematician, and this was thought to be preferable to the use of external computing services.

E.R.A. Reports

A RECENT report of the British Electrical and Allied Industries Research Association, Ref. L/T279, "The Torsional Vibrations of Long Chain Molecules III," by B. Szigeti (6s), is a continuation of the work dealt with in Refs. L/T266 and 267. For isolated long chain ketones in the extended configuration, with the CO-group near the centre of the chain, the effect of the chain ends on the amplitude of the torsional oscillations of the CO-group is calculated. It is found that the importance of these end-effects does not diminish with increasing chain length.

If the number of carbon atoms is odd, then for the model discussed the mean square amplitude of the CO-group differs by about a factor 2 according to whether it is on the same side of the chain axis as the end groups or opposite to them. The frequencies of vibration are probably not much influenced by these effects.

Tests, made in general accordance with the method described in Ref. A/T124, have been carried out to determine whether subjecting coils impregnated with varnish to total immersion in water has a permanent effect on the moisture-resisting properties of the varnish. It is shown in Report Ref. A/T138, "The Permanent Effect of Water on Varnished Coils," by H. R. Heap, B.Sc. (7s 6d), that varnished coils treated in this manner are permanently damaged.

Should these varnished coils form the winding of a motor operating under adverse moisture conditions and into which, owing to some fault in protection, water may have entered, it is thought that drying of the winding will not restore the insulation to its original condition unless the drying period is followed by re-impregnation of the coils.

Flameproof Apparatus

The linear law, hitherto used in determination of statistical maximum safe gaps

in E.R.A. reports on specific combustibles, is now found to be an over-simplification in the face of accumulating experimental results on the 1in flange, including a few recently available on the ½in flange, and it has been decided to replace it by a more appropriate method of treatment. Report Ref. G/T279, "Flameproof Electrical Apparatus. Re-assessment of Values of Statistical Maximum Safe Gap on the Bases of the Integral Curve of a Normal Distribution," by C. E. R. Bruce, M.A., B.Sc. (6s), describes the new method of assessment and tabulates the results, together with the earlier values for comparison, for all the combustibles used in industry on which work has so far been done.

The new values are lower than those obtained by the earlier determination, but in most cases for the 1in flange the decrease is not sufficient to bring them below the existing lower limit for the statistical maximum safe gap (s.m.s.g.) values specified by the B.S.I. for the group concerned. It should be noted that this report does not deal with the specified "permissible gap," which in general has a value much below the specified lower s.m.s.g. limit referred to in the last paragraph.

A supplement to the above report is available at 7s 6d which amplifies briefly and supports with experimental evidence (based on some 5,000 tests) the explanation given in Report Ref. G/T279. It contains a short outline of the procedure used to obtain the experimental data for the determination of the maximum experimental safe gap (m.e.s.g.) and the re-assessed s.m.s.g. It also describes the steps that have led to the adoption of this new method, which now supersedes the one based on a linear law used in obtaining the values recorded in B.S. 229 : 1946, Appendix D.

Impregnated-Paper Capacitors

The effectiveness of stabilizers in retarding deterioration of paper capacitors impregnated with chlorinated hydrocarbons is already well known from laboratory experiments. Report Ref. L/T 268, "Stabilization of Impregnated-Paper Capacitors. Pilot Scale Tests with Azobenzene," by H. F. Church (12s), describes tests designed to investigate the suitability of one stabilizer, azobenzene, for use under factory conditions.

The results show that the long lives under d.c. stress at elevated temperature previously attainable only with non-polar impregnants such as petroleum jelly are now possible with chlornaphthalene impregnant if 2 per cent of azobenzene is added. Freedom from contamination of the units and high purity of the impregnant and stabilizer are essential if the full benefit of stabilization is to be obtained. Extensions of mean life up to 30 times with 2 per cent addition of azobenzene have been recorded.

For long life, kraft paper is to be preferred to linen paper, and the difference is explained. Under the same stress conditions, a three-paper layer dielectric gives longer life than one having only two layers.

Copies of the above publications are available, at the prices indicated in parentheses, on application to the E.R.A. at Thorncroft Manor, Dorking Road. Leatherhead, Surrey.

Brazilian Electrification Fund

From Our Rio Correspondent

PRESIDENT VARGAS has submitted a Bill to the Brazilian Congress creating a Federal Electrification Fund to finance production and distribution of electrical energy and the development of an electrical manufacturing industry. The Fund will be raised by a surcharge on electricity supplied to consumers and increased taxes on beverages and certain other goods.

In his message to Congress the President pointed out that the shortage of generating plant, which now amounts to 1,000 MW, would probably reach 2,900 MW in five years if the present capacity remained stationary. An investment of £580 million would be required to make good this deficiency. New power stations were being built throughout the country and priority had been given to projects to increase installed capacity and improve transport, but funds were urgently needed to accelerate the work.

The President has instructed the Minister of Finance to facilitate credits to the Companhia Hydro-electrica do Sao Francisco to speed up plant extensions. A third 60 MW generator is now being installed at the Catu substation and a second underground power house is being built to raise capacity of the Paulo Afonso station to 360 MW by 1956–57. The National Bank for Industrial Development (Brazil) will advance the equivalent of £6 million to finance the present stage of the company's expansion programme and extend transmission lines into adjoining States. By 31st December last the Brazilian Treasury had paid out £17.174,000 on the Sao Francisco power station.

Bio-Electric and Lunarcyclic Phenomena

Some Revelations of Medical Research

By L. R. C. HAWARD, D.Psy. (Leiden), M.A., B.Sc.

ELECTRICAL activity which takes place in the human body has been very intensively studied over the last decade, and medical science now uses specific fluctuations of the potential difference existing at certain centres, particularly the heart and brain, as a matter of diagnostic routine.

There are, however, potential differences which exist independently of overall electrical activity and exclusive of specific organs of the body. Readings (d.c.) between two electrodes attached to the head and some lower part of the body show that a p.d. exists between these two points within the range plus 18 to minus 7 mV. A recent investigation of this phenomenon on a large scale has shown that the normal p.d. fluctuates between these two limits and, what may be more significant, that everybody reaches the peak simultaneously.

This research is being carried out jointly at Yale University School of Medicine and Duke University, Durham, the research teams being under Dr. L. J. Ravitz, M.D., and scientific papers reporting various aspects of the work have appeared.*

The research is being continued as part of a long-term medical project and is concerned, at the moment, purely with the psychological concomitants of the cycle rather than the absolute nature of the p.d. or its fluctuations.

Results of Experiments

In an attempt to relate this cyclic activity to other bio-electric states, electrodes have been implanted into the trunks of healthy trees, and attached to various types of laboratory animals. All have shown the same cyclic variations, following a sinusoidal curve, and all records have the same phase.

Medical research conducted on the experimental subjects concomitantly showed that there was no correlation with other physiological aspects, such as blood pressure, respiration rate, and so on. Very recently, however, two important relations have been discovered.

Influence on Personality

One is that personality changes appear to follow the bio-electric variations, the mood being one of depression when the p.d. is negative, and of excitement and gaiety when positive. Further, when the p.d. exceeded the normal limits the behaviour became exaggerated: plus 20 mV produced temper tantrums and over-energetic conduct, minus 20 mV was accompanied by acute sullenness, sulking and moroseness. From this observation it could be seen that the narrower the limits between which the p.d. fluctuates, the more stable the personality and, conversely, the wider the limits, the more unstable and emotional the person becomes. A corollary of this is provided by results from mental hospital research, which shows that the mental patients show a much higher potential than is recorded for normal individuals.

The second, and rather interesting relation which has been found to exist between the p.d. cycles, is that of the lunar phases. Maximum positivity occurs following a new moon, while periods of greatest negativity occur approximately with full moon. Plant and animal variations follow these lunar cycles in exactly the same way.

This research has most important implications, for it suggests that all bio-electric activity is subject to some external universal force, that some unknown factors are acting upon all living systems with a regular periodicity. Whether the moon is the causal agent, or, as seems more probable, the terrestrial satellite movements are themselves conforming to this influence, we

*J. *Clinical and Experimental Psychopathology*—13: 69-106: 1952. *Connecticut Medical Journal*—16: 499-505: 1952. *D. Neurology and Psychiatry*—20: 350: 572: December, 1952.

cannot yet say for certain. Research which is being continued along these same lines is still concerned with the medical aspects of the phenomena: it would be extremely interesting if electricians dealing with potentials of this order over long periods in non-biologic systems had experienced similar fluctuations without realizing it. It might then be possible to decide whether this influence is universal, in the Einsteinian sense, experienced through the medium of electro-magnetism, or whether it is a feature of life itself, possessing no scientific explanation.

E.I.B.A. Annual Meeting

At the annual meeting of the Electrical Industries Benevolent Association held in London on 22nd July Mr. R. H. M. Drake, the retiring president, referred to the good progress which had been made during the previous year, but emphasized the need for putting the Association on a more permanent financial basis by getting more regular subscribing members, so that it would be less dependent on special items and "stunts" for raising its income. In introducing Sir John Dalton as the Association's president for the forthcoming year, Mr. Drake said that he was bound to be able to extract vast sums of money from the electrical industry for the E.I.B.A. in the same manner as he had made a success of everything else that he had touched previously.

After taking over the chair, Sir John Dalton paid tribute to the hard work put in by Mr. Drake, and said that he might well feel abundantly satisfied with the outcome of his year of office. During that year, the Association had increasingly served the industry, but in spite of this the balance carried to the capital account in 1952 was over £5,000.

Mr. E. E. Sharp, in seconding the appointment of Sir John Dalton as president, congratulated the Association on its development since the days of his presidency in 1938. He hoped that, in support of Sir John Dalton in his year of office, every really important man in the electrical industry would make arrangements to subscribe sufficient to make him a senior warden.

Earlier, the president had particularly welcomed Mr. and Mrs. E. E. Sharp, who now live in Capetown, on being the first members of the Association to travel 6,000 miles to attend an E.I.B.A. annual meeting.

Mr. A. B. Wildsmith, in moving the adoption of the annual report and accounts for 1952, said that it would be obvious that when there had been a 27 per cent increase in one year in the new cases tackled by an Association its branches must have carried a very heavy burden, and that he had to pass on to all who had helped in this work the thanks of the innumerable people who, having found new hope in life, had written to the Association expressing their gratitude. Speaking of the Association's home for retired people, he urged that every member of the Council who had not yet been to Broome Park should do so.

The chairman of the Finance Committee, Mr. A. E. Page, in seconding the proposal, said that the most notable financial change was the saving of over £4,500 in the amount spent on treatment in private sanatoria, following a welcome decrease in the number of emergency tuberculosis cases; even so, however, the Association had spent over £37,000 in grants to its beneficiaries during the year.

The following new appointments to the Council were made: Messrs. Raymond Berry, R. A. Marryat, C. T. Melling and H. V. Pugh. Mr. H. A. Deacon was reappointed chairman of the Court, and Mr. A. E. Page was appointed as an additional member of this body.

Southampton Electric Club

THE inaugural general meeting of the Southampton Electric Club will take place in the Polygon Hotel on 4th September at 7 p.m. Arrangements are in hand for the winter programme, which will include talks on a variety of subjects at meetings on the first Friday of every month.

Deterioration of Equipment

Results of an American Investigation

RESEARCH into the effects of climatic conditions on equipment and packaging materials has led to the development of improved methods of protection. Progress in the United States in these respects during the war and post-war periods was surveyed by an Ordnance Panel on Preservation of Materials and Packaging, whose proceedings have been published by the U.S. Research and Development Board. A microfilm of the report has been acquired by the Technical and Documents Unit of the Department of Scientific and Industrial Research.

Main Causes

The reasons for the deterioration of electrical and electronic equipment under tropical conditions are discussed by A. M. Rogers Squier, of Signal Laboratories, who lists the following main causes: sacrifice of quality to quantity during the early stages of emergency situations; shortages of certain strategic materials with consequent substitution; poor packing, together with improper storage and handling; inadequate training in handling, storage and maintenance, due to the sudden expansion of the Armed Forces; environmental factors causing deterioration (such as moisture, sunlight, dust and temperature).

It is considered to be of paramount importance that careful and complete performance tests should be made of components, materials and equipment to determine those characteristics which are subject to tropical deterioration, and that testing procedure for both laboratory and field tests should be standardized.

The conference was shown a radio receiver that had been used in island operations during the last war and was outwardly in quite good shape. Electrical measurements made on the power and speaker cable assembly under fair conditions (i.e., relative humidity of about 50 per cent and temperatures of 75 or 80 deg F) disclosed insulation resistances of the order of 8, 12, 22, 20 and 12 megohms. That of a similar piece of equipment in a temperate area under ideal conditions would probably have been of the order of thousands of megohms.

Deterioration of electric and electronic equipment in tropical areas is ascribed to two basic troubles, moisture and corrosion of metals, particularly that caused by the chemical activity of insulating boards, moulded plastics, and impregnation varnishes, accelerated by the presence of moisture.

Measurements made on component parts of transmitters considered salvageable showed that certain types of components, such as the "bathtub" type of capacitor, had maintained a high level of quality, insulation resistance being of the order of 5,000 megohms, yet the "postage stamp" type of mica capacitor had deteriorated to a level that gave insulation resistance measurements of 12, 46 and 90 megohms, which were far below the minimum performance figures specified.

Moisture Protection

Research has been directed towards the development of items which will not require additional protection against moisture. For those components and materials which, because of "miniaturization" or other design features, do not lend themselves to high performance levels under high-moisture conditions, the use of unit construction by hermetic sealing or casting techniques is advocated.

It is contended that if electrical equipment is properly packaged and delivered to the operating unit in good condition, and is then maintained and operated under fair coverage conditions, a fairly high degree of performance can be maintained with the general level of components and materials used to-day. The corrective action indicated is summed up as good design, plus the best available components and materials; vapour-proof packaging and

good storage condition; good preventive maintenance.

Experiments have been made at Frankford Arsenal with various types of material including cellulose acetate, polyethylene, vinyl, paper, cloth-backed pressure tapes, etc. The vinyls are regarded as the best materials examined from the dielectric and mould-proof standpoint, followed by cellulose acetate and polyethylene.

The need for moisture and fungus protection was emphasized by Walter N. Ezekiel, Bureau of Ordnance (Navy), who told the conference that in a survey of vessels during 1945 fungus growth and corrosion were found on the electrical equipment of every ship examined.

One approach to this problem is the use of inherently better materials. In 1945 much of the wire employed was of the old cotton-braid covered kind. Insulation was often provided by fish paper or by soft plastic separator straps that became good conductors when moist and were readily overgrown by fungi. Linen-type lacing cord and black friction tape were centres of abundant fungus growth; in telephone boxes, for example, metal parts were often corroded, particularly when near the mouldy portions. In examining this corroded and mouldy equipment deplorably low electrical insulation values were encountered.

Fungus Resistance

The moisture and fungus proofing programme has led to information on suitable fungicide coating materials for use in protective treatments. This work has underlined the need for clarification of test procedure. Reference was made to an existing specification requiring that no "deleterious" fungi should grow on the material used. No indication was given, however, as to what was deleterious, how deleterious fungi were to be recognized, or how material was to be tested for acceptability. Thus this specification was not very helpful to equipment manufacturers. There is a need for recognizing just what kind of fungus resistance is sought and of employing test procedures both in research and in specifications that will aim at this specific goal.

The definitions required for electrical and electronic equipment are listed as follows: (*a*) "Funginertness" of a material or component, this word referring to the inherent property of not supporting fungus growth; (*b*) "fungistatic" and/or fungicidal properties resulting from a specific fungicide actually within a material or component; (*c*) fungistatic protection obtained by applying coating materials over surfaces (the coatings require tests before use rather than when used on the part); and (*d*) fungus and moisture resistance of the completed equipment or assembly.

The need for a clearer definition of the kinds of resistance and the kinds of test is well illustrated by experience with electrical insulating hook-up wire. The old cotton-braid covered wire was obviously the centre of damage in many equipments. For more than five years the research programme of the Ordnance Department encouraged the use of the nylon jacketed type. Nylon is inherently fungicidal and during investigations it retained good insulation characteristics even after two months at 100 per cent relative humidity, while braid-covered wire lost surface insulation in a few days, even when sprayed with a superficial varnish or lacquer coating. Yet both types continued to be listed under JAN-C-76 and the only fungus-resistance test provided by this specification was a check as to whether a fungistatic agent had been used in a varnish or lacquer on the braid-covered type of wire. In order to get better wire into equipment under construction, the Bureau of Ordnance had to issue a specification which called for the inherently better nylon-jacketed wire or similar wire.

Many other aspects of preservation and packaging research are discussed in the report. The relation between temperature, humidity and time of day is shown graphically for a variety of storage conditions in tropical situations. A test for evaluating the moisture resistance of components is described.

Chemical Engineering Conference

THE Institution of Chemical Engineers and Chemical Engineering Group (Society of Chemical Industry), is holding a chemical engineering conference at Olympia, London, from 7th to 11th September, during the run of the Engineering, Marine and Welding Exhibition and the Chemical Plant Exhibition. The conference will be open to all visitors to the exhibitions, and inquiries should be addressed to the Secretary, Institution of Chemical Engineers, 56, Victoria Street, S.W.1.

VIEWS on the NEWS

By REFLECTOR

THE insatiable demand for electricity is leading to the quest for new sources of energy. One of the latest to come to my notice is a Japanese plan to utilize the heat in volcanic lava for the generation of electric power. It is reported in the *Electrical World* that the Kyushu Electric Power Co. has applied to the Japanese Government for permission to undertake a scheme of this kind. The method proposed is to drill holes 200ft deep in the hot lava, fill them with water, and use the resultant steam to operate generators. It is stated that a plant costing £200,000 is contemplated. I can think of more comfortable jobs than operating a power station on such a site.

* * *

Tenants of former R.A.F. huts on an airfield in the Midlands are complaining—justifiably it seems—that their electricity costs too much. Apparently the Ministry of Works, which owns the property and takes a bulk supply of electricity from the Midlands Board, has had to increase the charges to make good losses. At a meeting of Evesham R.D.C. it was stated that one of the tenants "had to stand by his meter dropping in coppers while his wife boiled the kettle." Cooking the Sunday dinner must be a problem.

* * *

As reported in the *Electrical Review* recently, the National Federation of Ironmongers is contemplating marketing a low-priced electric lamp. Commenting on this proposal, the *Ironmonger* says, quite rightly, that because a lamp is cheap in price it is not necessarily cheap in quality, but I do not agree with the assumption that "Few people would notice the difference of a hundred or so hours' shorter life in their lamps, nor would they remark a degree lower luminosity." My experience is that fancied shortness of lamp life is a sore point with many people (several complaints on this score were dealt with at a Consultative Council meeting last year). Moreover, I am sure that the public generally is getting more and more "light conscious." A point not always taken into account is that some fittings, such as the spherical glass type, limit the size of lamp that can be used and it is therefore essential to obtain the maximum light output.

* * *

Earlier this year I mentioned that the *News of the World* astrologer had specified a certain day as an auspicious occasion for considering the advantages of new electrical apparatus. Since then further similar references have appeared in that newspaper, the latest being one suggesting that the reader should on a particular date "consider the possibilities of more electrical equipment at home or in business." If this goes on I shall begin to believe that there is something in astrology after all.

* * *

In a letter to the *Manchester Guardian* a correspondent laments that the development of the steam road vehicle was neglected in favour of the internal combustion engined type. He goes so far in his advocacy as to say that "steam cars are as silent as an electrically propelled vehicle." This I take leave to doubt and, moreover, the emissions from both the steam and the petrol vehicles provide a strong argument in favour of the "electric."

* * *

Dealing with a delay in the provision of electricity to some tenants on a large housing estate at Dudley (Worcs.), the *Birmingham Gazette* says that while their more fortunate neighbours enjoy the advantages of electrical service these poor people "must struggle with antiquated boilers and turn up the gas mantles installed when the houses were built in 1933." Here the gas industry scores; no electric lamp would last so long.

PERSONAL and SOCIAL

News of Men and Women of the Industry

AT the annual meeting of the Electrical Industries Benevolent Association, a report of which appears elsewhere in this issue, **Sir John Dalton** was elected president for 1953-54 in succession to Mr. R. H. M. Drake. Sir John, who is chairman of W. T. Henley's Telegraph Works Co., Ltd., is, of course, well known in the electrical industry, especially for his long association with the former County of London Electric Supply Co., Ltd., of which he was for many years a director and joint general manager, and later as director of the Cable Makers' Association. He left the C.M.A. to join the board of Henley's at the end of March this year, and succeeded Sir Montague Hughman as chairman of the company. During the last war Sir John was regional controller of fuel and power, London and S.E. England, and chairman of the Public Utilities Coal Committee.

Sir John Dalton

The directors of the Brush Electrical Engineering Co., Ltd., have agreed at the request of Simms Motor Units, Ltd., to release **Mr. John Ayres,** at present managing director of Petters, Ltd., from his service agreements with the Brush group, to enable him to take up the appointment of general manager and director of Simms Motor Units, Ltd., on 1st October next. The Brush board announces that **Captain R. C. Petter** will, as from that date, be appointed managing director of Petters, Ltd. Captain Petter, who is a member of the Brush board, has agreed to assume these responsibilities on a temporary basis until it is possible for the board to make a permanent appointment.

Mr. K. P. Wood, M.A.(Cantab.), informs us that he has resigned from the board of James Beresford & Son, Ltd., Birmingham, and severed his connection with the company, as from 22nd July. He joined the company as sales manager in 1933, and in 1945 he was elected to the board. He received his training with the Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Belliss & Morcom, Ltd., Birmingham, and Lancashire Dynamo & Crypto, Ltd., Manchester, and with the last-mentioned concern he subsequently held a position in the sales organization.

Mr. Charles Brown, of Southampton, celebrated the completion of twenty-five years as a representative of the light group in the employment of Philips Electrical, Ltd., on 9th July. The celebration took the form of a luncheon, given in his honour at the Queen's Hotel, Portsmouth, which was attended by his colleagues and at which Mr. Brown was presented, on behalf of the company, with a gold wrist-watch and a cheque. His wife was present and received a bouquet.

Mr. L. D. Harkess, Deputy Director of Contracts, Post Office, has been appointed Director in succession to **Mr. A. G. Robertson,** C.B.E., who has been appointed Director of the Post Office in Scotland. Mr. Harkess began his Post Office career as a boy messenger in Edinburgh. In 1946 he was appointed Assistant Director of Contracts, and Deputy Director in 1949.

Mr. C. W. A. Priest, B.Sc.(Eng.), A.M.I.Mech.E., M.I.E.E., generation engineer (construction) of the Southern Division, British Electricity Authority, has been appointed chief generation engineer (construction) of the South Wales Division. He succeeds **Mr. T. H. Wood,** M.I.Mech.E., A.M.I.E.E., who recently retired. After a period with the English Electric Co., Ltd., at Dick Kerr Works, Mr. Priest joined the London Electric Supply Corporation in 1923 as an assistant engineer at Deptford power station. He remained at Deptford when the London Power Co. took over, and obtained experience in a number of posts before becoming turbine house engineer. Mr. Priest left Deptford in March, 1936, to become turbine house operating superintendent at the Fulham power station, which was commissioned later that year. Late in 1939 he joined Battersea Borough Council as chief assistant engineer,

Mr. C. W. A. Priest

becoming later deputy general manager and engineer. On the reorganization of the electricity supply industry in 1948, Mr. Priest took up his present position with the Southern Division of the B.E.A.

The Government of India has in hand a five-year development plan for the modernization of its Overseas Communications Service, and the extension of India's external telecommunications services. It applied to the Bureau of Technical Co-operation in Colombo for the extension of facilities, under the Colombo Plan, for the training of two Indian communications engineers in up-to-date methods of long-distance communications. The British Government offered facilities which the Government of India accepted, and it has nominated **Mr. Purshottam Ganesh Damle** and **Mr. Ramaswami Parthasarathy**, assistant engineers of the Overseas Communications Service, for eight months training in the United Kingdom. Mr. Damle and Mr. Parthasarathy arrived in the United Kingdom early in July. They will spend two months with the Engineering Department of the G.P.O. and the rest of the training period in Government and industrial institutions, starting in London and later visiting various centres in the provinces.

Dame Caroline Haslett, D.B.E., J.P., was unanimously elected for a further three-year term of office as president of the International Federation of Business and Professional Women during the 6th Triennial Congress held at Stockholm from 5th to 10th July.

Mr. H. A. Springer has been appointed an additional director of Sangamo Weston, Ltd., and **Mr. B. Epstein** has been appointed secretary in place of **Mr. F. R. Butherus**, who continues to be a director.

Mr. R. E. W. Greenway, station superintendent at Wimbledon since 1926, is retiring on 7th August. Before going to Wimbledon in 1918 as charge engineer, Mr. Greenway was with the former Twickenham & Teddington Electric Supply Co., and he also served at Stepney, Torquay and Bradford.

Mr. J. H. Hall has been appointed to the board of Allen West & Co., Ltd., to fill the vacancy created by the resignation of **Mr. Allen West**.

Mr. F. Lloyd-Kessel, chairman and managing director of Lloyds Engineering Companies, Ltd., is leaving at the end of this month for a continental tour visiting Belgium, Luxembourg, France, Switzerland, Austria and Germany. This tour has been arranged with particular reference to the associated company H. Fisher (Oldham), Ltd., in order to study the effects of foreign competition against British products on the domestic appliance markets in other countries. Mr. Lloyd-Kessel is also visiting a number of well-known industrialists in Germany to discuss possible co-operation with regard to marketing and manufacturing in Germany under British licence.

Mr. G. W. Kovach has been appointed managing director of Whitefield Machinery & Plant, Ltd. He was formerly business manager and technical adviser of the Oldfield Engineering Co., Ltd., Salford.

Mr. C. R. Bates, A.M.I.E.E., has given up his practice as a general industrial electronic consultant in order to specialize in electronic welding controls, becoming a director of Bates & Bates, Ltd., 73, Ashville Avenue, Birmingham, 34, who are manufacturing synchronous controls to his designs and patents.

Mr. G. J. Pluckrose has joined the British Central Electrical Co., Ltd., as assistant to the general manager. He was previously with the British Thomson-Houston Co., Ltd., Rugby.

Mr. Eric R. Thomas, managing director of Elcontrol, Ltd., was married on 18th July to Miss Joyce Hulatt.

The Parliamentary Secretary to the Ministry of Transport, Mr. J. Gurney Braithwaite, M.P., has appointed **Mr. P. G. Hudson** to be his private secretary.

Mr. G. Keith Drew has joined the Kelvinator Division of Nash-Kelvinator, Ltd., as sales manager. **Mr. Duncan Welch** becomes assistant sales manager.

A party of 110 employees of the **General Electric Co., Ltd.**, Witton, their wives and families, left Birmingham on Friday last week for a 16-day trip to Austria. The party have between them raised over £6,000 to finance the trip. The outward journey includes visits to Brussels, Aachen, Cologne, Bonn and the Rhine Valley on their way to Ingls, near Innsbruck, where they are spending four days. They will return via the Brenner Pass, Zurich, Basle and Paris.

OBITUARY

Mr. James J. Fraser, managing director of Honeywell-Brown, Ltd., died at his home on 17th July aged fifty-one. In 1928 he joined the Minneapolis-Honeywell organization in Canada, where he became manager of the Montreal office. When, in 1936, a decision was taken to form the British company of Honeywell-Brown, Ltd., Mr. Fraser was chosen for this work. As managing director since its inception, he has been directly responsible for its growth and development over the years.

Mr. Walter Yates, chairman and governing director of Matthews & Yates, Ltd., and a founder member of the company, died on 11th July at the age of eighty-eight. He was a past-president of the Institution of Heating and Ventilating Engineers and was also a member of the Institution of Mechanical Engineers.

Dr. George Leslie Kelley, vice-chairman of the Pressed Steel Co., Ltd., since 1948 and former managing director and scientific adviser, died at Oxford on 25th July.

Mr. W. J. Terry.—The death occurred on 27th July at the age of seventy-four of Mr. William Joseph Terry, chairman and managing director of the London Electric Wire Co. & Smiths, Ltd., managing director of the Liverpool Electric Cable Co., Ltd., and a director of the Vactite Wire Co. He was also a former chairman of the Cable Makers' Association.

WILLS

Mr. H. M. Thompson, deputy station superintendent at Thorpe generating station, Norwich, who died on 31st October last, intestate, left £4,621 gross (£2,629 net).

Mr. J. Fisher, for nearly thirty years sales manager at the Southampton works of Pirelli-General Cable Works, Ltd., who died on 14th February, left £3,927 gross (£3,355 net).

Mr. J. H. Rider, M.I.E.E., M.I.C.E., M.I.M.E., a pioneer of the early days of electricity generation and distribution and also of electric traction in this country, who died on 23rd April, left £41,652 gross (£41,416 net).

Mr. J. J. Honan, A.M.I.E.E., B.L., late assistant examiner H.M. Patent Office, who died at Limerick on 27th October last, left estate in England and the Republic of Ireland valued at £1,691.

Mr. A. Stanley, late managing director of Simon-Carves, Ltd., who died on 27th January, left £150,872 gross (£150,127 net).

Experimental Railcar

A SINGLE-DECK railcar incorporating Metropolitan-Vickers electrical equipment is being tried out in Leeds to decide whether it will be adopted as the standard car for the projected new high-speed service to outlying areas. The car is fitted with four axle hung motors, two per bogie, each developing 50 h.p. at 300 V. This enables rates of acceleration up to 3 m.p.h./sec to be attained and rheostatic braking rates up to 2½–3 m.p.h./sec are available.

To minimize noise and reduce wear on the equipment as a whole, considerable use is made of rubber on both the gear wheels and the motor suspension. The gear wheels are in two parts, the rim carrying the teeth, and the hub complete with spokes. Rubber bushes couple these two parts together, so that the transmission of road shock from the track to the gear teeth and from thence to the rest of the equipment is reduced and the noise minimized. The use of helical gears ensures smooth transmission of power to the road wheels.

The axle suspension of the motor employs a resiliently mounted axle tube running on roller bearings on the axle. This tube is joined to the motor through rubber bushes and there is thus a second line of defence against the transmission of road shock to the equipment.

Electro-pneumatic control gear is used and all the equipment, with the exception of the controllers and the main resistor, is in the tower of the car roof. In the operation of these switches, the control current, which is fed via one of the two master controllers, operates two valves, one of which closes the exhaust of the operating cylinder, while the other admits air from the main reservoir to the switch operating cylinder. This displaces the piston, which closes the switch. If the control coil is de-energized, the supply of air to the operating cylinder is cut off and the cylinder itself is exhausted to the atmosphere. The switch is then opened by the return spring.

As the various switches close, the starting resistance is cut out in such a manner that the passenger feels no jerks as the car accelerates, while automatic acceleration ensures smooth acceleration, even with an inexperienced driver. The position of the driver's handle controls the rate of acceleration as well as the speed at which the car will run, while if the handle is moved in the opposite direction to that for power, electric braking is obtained.

During electric braking the rheostatic current so generated is also used to energize track brakes and supplement their pneumatic operation. Separate air braking of the wheels is alternatively available.

A final safeguard on the braking circuit is a patented "emergency brake switch," which ensures that in case the air supply or control battery fails, then full electric braking is automatically applied.

Television Conference

ENGINEERING representatives from the broadcasting organizations of the five Western European countries concerned in the relaying of the Coronation programmes—France, Belgium, Holland, German Federal Republic and Great Britain—took part in a three-day conference at Broadcasting House, London, this week. A proposal for the exchange of television programmes during the Christmas period and plans for the setting up of permanent television links between the countries concerned were among the subjects discussed.

Cable Standards

Commonwealth Conference in London

A COMMONWEALTH Conference on Cable Standards was held in London from 14th to 22nd July, and was attended by representatives from the national standards organizations of Australia, India, New Zealand, Pakistan and the United Kingdom. Observers from Ceylon and the Union of South Africa were also present. The chairman of the Conference was Mr. P. V. Hunter.

The primary object was to secure a better understanding of the different points of view on standards for rubber-insulated, paper-insulated and p.v.c.-insulated cables, and to endeavour to make recommendations for subsequent consideration by the standards bodies in the Commonwealth to secure as much uniformity as possible. Those attending were not empowered to make decisions which would commit the various National Committees on any principle or detail. The report of the discussions will be referred back to these Committees for consideration.

It is hoped that further conferences of a similar nature will take place from time to time so that the standards for cables developed in the Commonwealth countries can be drafted on similar lines to the greatest possible extent.

The Conference agreed in principle on the desirability of cable standards in Commonwealth countries being as nearly as possible the same. It was appreciated that in some countries the standards are statutorily enforceable and cables and flexible cords which do not comply with them cannot legally be used or sold, a fact that to some extent determines the form of the standards. A revision of existing standards in those countries cannot therefore be made without full consideration of the statutory implications. Among the recommendations requiring special consideration by the National Committees were the following:—

Rubber-Insulated Cables

Differing views were expressed on the advisability of specifying the composition of the rubber insulation instead of relying entirely on test requirements to assess its quality. It was recommended that all Commonwealth countries should reconsider this matter and, in the event of their deciding in favour of specifying the composition, consideration should be given to the views expressed at the Conference on the advantages of a low volumetric limit of rubber content. Consideration should also be given to the desirability of specifying two separate grades of compound for use in temperate climates and in tropical climates respectively.

The Conference had its attention called to a proposal, which has received support in the United Kingdom, that the thickness of insulation should be expressed in terms of a minimum value only, without reference to the average value. It was noted that in all Commonwealth countries the insulation thickness is at present expressed in terms of a minimum average value, associated with an absolute minimum at any point, and the Conference recommended that this method of expressing thickness should be retained.

Rubber-insulated cables should be classified into medium-voltage general-purpose cables and medium-voltage heavy-duty cables. The former are suitable for use on any system where the voltage to earth does not exceed 400 V, and on any three-phase system with earthed neutral point in which the voltage between conductors does not exceed 690 V. Medium-voltage heavy-duty cables are suitable for operation at 660 V to earth and on any three-phase system with earthed neutral point in which the voltage between conductors does not exceed 1,100 V.

The Commonwealth standards bodies were requested to consider the possibility of adopting thicknesses for the general-purpose medium-voltage cables equal to 85 per cent of the thicknesses specified in B.S. 7 : 1946 for 250 V cables, subject to a minimum insulation thickness of 0·030in. It was recommended that the figures so determined should be specified to the nearest mil to provide a more logical

system of increasing insulation thickness with conductor size.

The national standards bodies should consider adopting flexible cords with the proposed modified "standard" (or "nominal") thickness of insulation for all purposes, since the special cords with reduced thickness of insulation previously intended for vacuum cleaners, pendant lighting fittings and the like were now regarded as redundant.

With regard to paper insulated cables, factory lengths of cable should have their ends labelled A and Z respectively, the A end having cores numbered in a clockwise sequence and the Z end having the cores numbered in an anticlockwise sequence. To identify l.v. (1,100 V) cables a perforated paper tape was recommended for inclusion over the sheath. The same dimensions of bedding, armouring and serving were recommended for adoption for both rubber-insulated cables and paper-insulated cables, and a recommendation was made regarding a specification for the compounds used in beddings and servings.

P.V.C.-Insulated Cables

Cables insulated with p.v.c. should be classified into medium-voltage general-purpose and medium-voltage heavy-duty grades as for rubber-insulated cables. The Indian and United Kingdom National Committees should consider reducing the dimensions of the single-core unsheathed p.v.c. cable to correspond with the single-core rubber-insulated cable. The Australian Committee should consider adopting a range of thicknesses of p.v.c. insulation and sheath on the same basis as those for rubber cables.

It was recommended that the Commonwealth Standards Committees should review the question of either specifying the limit of vinyl chloride content in the polymer, or specifying mechanical tests on the extruded p.v.c. compound. Insulation resistance figures should be based on a resistivity value of 2×10^{13} ohm/cm.

In view of the opinions expressed regarding the adoption of loss in weight or depreciation in tension strength as the most appropriate test criterion this matter should be further studied to determine the factor most indicative of service behaviour. Although various tests for determining resistance to fire, abrasion, etc., had been formulated, further information should be obtained as to how far these properties were inherent to p.v.c. compounds and therefore required governing tests, and to what extent physical performance was controlled by tests on the more fundamental properties.

The Conference completed its technical deliberations on Monday, 20th July. When the delegates met again on Friday, 24th July, they received and approved the final report. The chairman said he felt sure that the Conference had achieved its objective and he hoped that, as a result, the standards for electric cables in the Commonwealth countries would, in due course, be brought more closely into line with each other.

AUSTRALIAN NEWS

From a Correspondent

THE £1 million loan of the New South Wales Electricity Commission closed recently, fully subscribed. The State Electricity Commission of Victoria loan of £2 million was over-subscribed.

The Victorian Minister for Electrical Undertakings (Mr. Galbally) has revealed that the State Electricity Commission has £12 million worth of plant and equipment lying idle at Morwell, 90 miles from Melbourne. "Workers are waiting and the plant is on the site ready for erection," he says. "All the Victorian Government asks is a loan from the Federal Government so that the S.E.C. can pay the wages of the men needed to erect factories and get the Morwell plant going. When the factories are put up the loan will be liquidated out of sales revenue of briquettes and brown coal dust."

Mr. A. G. Warner, managing director of Electronic Industries, Ltd., giving evidence recently before the Royal Commission on Television, said that a 17-valve, 14in screen television receiving set will cost £150 7s retail in Australia. "The local receiving set will be bigger than the average English 12in set," he said, "and a little more expensive, because it will provide for 12 channels. At least 90 per cent of the set could be manufactured from Australian materials, and if sales tax was not charged in the early stages to give impetus to the industry, and if excise duty was omitted on valves, the price could be reduced by £30."

In the view of Mr. N. G. Crowley, assistant director of the Division of Industrial Development, not more than 250,000 receivers would be in use throughout Australia within four years of regular transmission. "In the first year sales might only be 20,000 or 30,000," he said, "rising to between 80,000 and 100,000 in the fourth year."

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Lords last week Lord Cherwell, Paymaster-General, replying to Viscount Falmouth, said that it was incorrect to describe the purposes of the new nuclear energy power station to be built at Sellafield as commercial. It was an experimental power station, and the Government could not commit itself to estimates of the cost per kilowatt installed including reactors, of the overall thermal efficiency or of the cost per kWh sent out on a 60 per cent load factor. He added that he would consider sympathetically how soon, and in what way, information about Government developments could be made available to consultants and other technical advisers who had had requests from different parts of the world about the building of nuclear energy or coal power stations.

Future of the B.I.F.

Asked by Lord Hawke whether the Government would carefully consider whether there was sufficient justification for the holding of the British Industries Fair every year and in its present form, Lord Mancroft said that the President of the Board of Trade had asked the Exhibitors' Advisory Committee to review the present arrangements, and their report was expected soon. In the meantime, the committee had expressed its unanimous opinion that the Fair should continue to be held annually. Arrangements were being made to hold next year's fair in London and Birmingham from 3rd to 14th May.

Lord Hawke asked whether it was known if all sections of industry were agreed that the present arrangements were the best possible.

Lord Mancroft said he thought there was some division of opinion within industry, but the textile industry, for example, only participated fully every other year. As far as he knew there had been in the last two years a decrease of almost 20 per cent in exhibitors. The actual figures were 2,892 exhibitors in 1951 and 2,280 in 1953. This fall had been most marked in the London Section. Suggestions to remedy the situation were, he believed, being considered.

Load Spreading Arrangements

The Minister of Labour (Sir Walter Monckton), replying to Mr. Nabarro in the House of Commons, said that the Electricity Sub-Committee of the Joint Consultative Committee had been considering the arrangements that would be required with regard to spreading the electricity load next winter. After reviewing the prospects in the various Regions and taking account of the welcome improvement in the supply position, the Sub-Committee recommended that no national load-spreading target should be set, but that Regional Boards for Industry should have discretion to make load spreading arrangements in the light of conditions likely to arise in their respective areas. It also recommended that all possible encouragement should continue to be given to the use of private generating plant and that domestic and small commercial consumers should again be asked to exercise maximum economy during the hours of peak load. The Government had accepted the recommendations and Regional Boards would, as in previous years, be responsible for working out detailed arrangements. He would like again to thank both sides of industry for their continued assistance in this matter.

Mr. Nabarro asked the Minister whether, when the report was published, he would consider drawing the attention of both sides of industry urgently to the grave shortage of house coal that was likely next winter, with the consequent special call on the use of electricity for domestic purposes which might create an unusual demand at peak hours and thereby interfere with industrial production.

Sir Walter Monckton said he had raised this point at a meeting of the National Joint Advisory Council, and both sides of industry had it well in mind.

Television Questions

Mr. Hobson asked the Assistant Postmaster-General if he would state the main centres of population for which applications had been made for commercial television licences, and the number of applications for each main centre of population.

Mr. Gammans said the figures were: London 19 applications; Birmingham 14, South Lancashire 14; Central Scotland 11; the Bristol/Cardiff area 11; and applications for 26 stations outside these main centres.

Mr. Geoffrey Wilson asked the Assistant Postmaster-General when the Government proposed to come to a decision on the allocation of broadcasting frequencies in Band III.

Mr. Gammans said this matter would not be decided until Parliament had had an opportunity of considering the questions referred to in the Lord Privy Seal's statement on 2nd July.

Asked when he proposed to set up an independent commission to control all frequency allocations, Mr. Gammans said, on present

evidence, the Postmaster-General did not consider that there was any need to set up such an independent commission.

Mr. Hayman asked the Assistant Postmaster-General what quality of reception viewers in different areas of Cornwall might expect to get if the proposal for a television station on North Hessary Tor was approved.

Mr. Gammans said that tests had shown first class reception should be available to about 570,000 people in an area of Devon and Cornwall including St. Austell, Launceston, Holsworthy, Plymouth, Totnes and Torquay. Generally satisfactory reception would be available to a further 730,000 people over the whole of the remainder of these counties except for some parts of North East Devon already served by the Wenvoe station and a very small area at Land's End.

Replying further, Mr. Gammans said that consideration was being given to alternative sites to North Hessary Tor. The Post Office had not had application from the B.B.C. to buy a site there.

Electricity Supply in Scotland

Mr. Malcolm MacPherson asked the Secretary of State for Scotland what conclusions had been reached as a result of the attentive examination which the Queen's Speech indicated would be given to the question of the supply of electricity in Scotland; and what legislation was contemplated.

Mr. Stuart said that changes in the present organization for electricity supply in Scotland required legislation which he was actively considering in consultation with the Minister of Fuel and Power. As to the nature of the contemplated legislation, he must ask the hon. member to await the presentation of a Bill.

Air Pollution

Mr. Dodds asked the Minister of Housing and Local Government what progress has been made in setting up the committee to inquire into the problem of air pollution. Similar questions were asked by Brigadier Medlicott and Mr. Hastings, who also inquired about the terms of reference and composition of the Committee.

Mr. Marples, Parliamentary Secretary, said that the Committee, which was being appointed jointly by the Minister of Housing and Local Government, the Secretary of State for Scotland and the Minister of Fuel and Power, would examine the nature, causes and effects of air pollution and the efficacy of present preventive measures, and consider what further preventive measures are practicable. The chairman of the Committee, which would begin work immediately, would be Sir Hugh Beaver.

GENERATION IN SWEDEN

DURING 1952 Swedish water-power plants produced about 20,000 million kWh. This means that about a third of the potential hydraulic power has been exploited. Power demands, however, are rapidly increasing. The annual rise in consumption is at present 1,200 million kWh, but from 1957 onwards it will probably be 1,500 million kWh a year. During 1953 £137,900 a day will be invested by the industry, half of which will be supplied by the Government. Of the country's total investments no less than 5 to 6 per cent relate to the electricity supply industry.

Last year the first large post-war project was inaugurated at Harsprånget. The second, at Kilforsen, is unusual in that the plant is situated about three miles from the river, the water being conducted through the woods to an artificial lake by means of a channel and a tunnel. After passing through the turbines 330ft below, the water is returned through another tunnel. The amount of rock removed was nearly 60 million cu ft. With a potential capacity of 240 MW, the plant will have an annual output of 1,100 million kWh. The first turbine was put into operation last April and all three turbines will be running by next spring.

In the meantime the State Power Board will have embarked upon its third post-war project, that at Stornorrfors on the Ume River. This is the last of the large-sized plants planned by the Board and will cost nearly £14 million. It will have a potential capacity of 375 MW and an annual output of 2,200 million kWh, 200 million kWh more than that of the Harsprånget plant. About 90 million cu ft of rock and soil will have to be removed. The same system of tunnels and channels as that used at Kilforsen is to be employed, but the head will be lower (240ft). The world's largest Francis turbines are to be installed in the underground machine hall.

Quebec Transmission Line

The Quebec Hydro-Electric Commission has been authorized to spend $4,000,000 on a transmission line connecting the Chibougamau gold mining area with the site of the Bersimis River power project.

OVERSEAS ELECTRICAL TRADE

Exports Decline in First Half of 1953

FOLLOWING the general trend of the country's export trade, shipments of electrical apparatus and machinery in the first half of this year, at £88,907,626, showed a decline of £7,871,155 in value compared with the total for January–June, 1952. Despite the Coronation celebrations, however, June's total for electrical exports, at £13,724,898, was higher than for the corresponding month a year ago (£13,013,486), though well below the figure for May (£14,622,668). A full analysis of the June trade is given in Table I, with details of the distribution of electrical goods and apparatus (as distinct from machinery) in Table II. India was

TABLE I.—ELECTRICAL EXPORTS

Class	June, 1952	June, 1953	Class	June, 1952	June, 1953
	£	£		£	£
Telegraph and telephone cables and wires (submarine)	6,280	234,737	Insulating cloth and tape	58,177	41,275
Ditto, not submarine	782,233	867,298	Other insulating materials	68,286	48,994
Cables and wires, paper insulated	742,433	905,417	Unclassified electrical goods and apparatus	503,699	573,403
Ditto, rubber insulated	667,465	467,044	TOTAL, electrical goods and apparatus	7,920,365	8,309,869
Ditto, cotton, silk or artificial silk insulated	42,858	37,925			
Ditto, enamel, glass or asbestos insulated	56,656	106,735	Diesel driven generators, not exceeding 10 kW		70,290
Ditto, other	265,493	286,173	Ditto, over 10 kW to 65 kW	363,671	162,845
Commercial radio apparatus	492,413	585,174	Ditto, over 65 kW to 200 kW		55,180
Domestic radio apparatus	303,387	269,095	Ditto, exceeding 200 kW	209,229	115,122
Telegraph, telephone and signalling apparatus	1,192,114	1,282,827	Other generating sets	63,055	90,362
Loudspeakers and microphones	51,365	42,393	Generators and parts of generators	341,424	693,768
Radio, telecommunication and electronic apparatus components and parts, n.e.s.	425,962	373,817	Motors, railway, tramway and trolley-bus	2,279	16,202
Other radio, telecommunication and electronic apparatus	88,919	229,976	Ditto, other, not over ½ h.p.	160,721	116,791
Cathode ray tubes	5,092	19,664	Ditto, over ½ h.p. but under 1 h.p.	51,363	23,265
Other valves	215,356	159,780	Ditto, from 1 h.p. to 250 h.p.	407,174	366,975
Carbons	13,333	16,394	Ditto, exceeding 250 h.p.	79,175	34,641
Lamps, exceeding 24 V	76,633	56,127	Ditto, parts	77,090	192,156
Ditto, not exceeding 24 V	34,435	17,314	Converting machinery	19,799	47,284
Other lighting appliances	371,617	404,586	Transformers, including coils	586,551	985,434
Primary batteries	146,993	226,590	Mercury arc rectifiers	52,176	27,702
Parts other than carbons	13,542	14,837	Motor starting and controlling gear	193,063	227,082
Accumulators for motor vehicles	191,502	140,418	Switchgear and switchboards (not telegraph and telephone)	1,176,966	1,328,709
Ditto, traction	10,068	21,659	Electrical machinery, n.e.s.†	326,346	105,413
Ditto, radio	5,041	7,728	TOTAL, electrical machinery	4,110,082	4,659,221
Other portable accumulators	100,404	61,879			
All other accumulators	113,667	37,236			
Parts and accessories	66,202	38,468			
Cooking appliances	109,473	70,750	Washing machines (not exceeding 150 lb. weight)*	412,597	140,491
Heating appliances	56,906	54,982	Ditto (over 150 lb but not exceeding 250 lb weight)*		59,687
Parts and accessories for cooking and heating appliances	61,290	65,414	Ditto, parts	16,655	51,302
Flat irons	48,578	41,952	Vacuum cleaners	127,007	126,565
Commercial electrical instruments	94,742	136,224	Ditto, parts	14,301	20,253
House service meters	195,244	58,996	Other electrically operated portable appliances	135,543	167,162
Time recorders and time switches	13,058	12,868	Portable electric tools	104,653	95,078
Other electrical instruments	87,307	142,187	Electrical pottery and glassware, including insulators	132,782	57,388
Electro-medical apparatus (not X-ray)	29,114	40,530	Electrical conduit tubes and cased tubes	39,501	46,882
X-ray apparatus, other than tubes and valves	36,975	35,533			
Vacuum tubes	46,140	46,757			
Permanent magnets	29,908	28,723	GRAND TOTAL	13,013,486	13,724,898

* Not separately distinguished in 1952.

† The two figures are not comparable.

the best customer for both generators (£172,235) and motors (£108,573), South Africa taking the largest shares of the other types of electrical machinery (£635,464). Canada bought generating plant to the value of £143,803 and "other electrical machinery" totalling £126,382.

With the exception of rubber insulated types, exports of which fell from £4,437,381 to £2,806,302, all classifications of cables and wires showed improved sales during the first half of the year, submarine from £359,850 to £498,470, other telegraph and telephone types from £4,084,139 to £4,344,072, paper insulated cables from £4,861,389 to £6,101,271, cotton, silk, etc., insulated from £387,135 to £391,659, enamel, glass or asbestos insulated from £447,888 to £552,824 and other types from £1,743,335 to £1,823,313.

Increasing demands from unspecified foreign countries contributed largely to a rise from £3,371,122 to £4,700,968 in overseas sales of commercial radio apparatus and helped to counterbalance a decline in domestic radio business with Malaya (from £269,000 to £68,733), Egypt (from £210,532 to £1,597) and other Commonwealth countries from £702,357 to £532,250, the total exports under this heading amounting to £1,856,549 compared with £2,406,304.

There was a decline from £869,733 to £520,039 in shipments of lamps, there also being some falling off in the demand for lighting fittings, etc. (from £2,735,716 to £2,616,633). There was a severe slump too in the trade in all types of accumulators, from £2,810,625 to £1,577,959.

Reduced buying by Australia (£102,182 compared with £874,739), New Zealand (£150,665 compared with £385,793) and South Africa (£172,663 compared with £290,509) was mainly responsible for declines in exports of cooking appliances from £1,610,192 to £479,366 and heating appliances from £555,482 to £432,865. Overseas trade in irons fell from £401,363 to £257,365. A decrease from £1,007,718 to £497,778 in house meter service business was partly offset by increased buying of other types of electrical instruments.

Big buying in Canada (£1,029,999 compared with £183,281) more than made up for substantially reduced business with British West Africa, Southern Rhodesia, Pakistan, the Irish Republic, Russia, Brazil and Argentina and raised the figure for generator exports from £8,096,495 to £8,756,949. A decrease from £5,000,919 to £4,999,031 in electric motor sales was due largely to reduced demand from Australia (£548,601 against £1,061,465).

Table II.—Distribution of Electrical Goods and Apparatus

Destination	June, 1952	June, 1953
	£	£
Channel Islands	32,839	23,942
Gibraltar	13,924	5,913
Malta and Gozo	11,532	11,339
Cyprus	21,050	27,979
Gold Coast	53,851	97,502
Nigeria	101,217	117,379
Union of South Africa ..	704,553	774,134
Northern Rhodesia	91,210	50,459
Southern Rhodesia	156,560	119,444
British East Africa	176,865	260,210
Bahrein, Qatar and Trucial Oman	42,302	80,084
Kuwait	56,862	83,162
India	791,401	1,066,019
Pakistan	275,184	78,089
Malaya	311,836	372,456
Ceylon	66,022	96,763
Hong Kong	143,426	109,808
Australia	404,540	526,882
New Zealand	690,759	415,977
Canada	192,336	490,653
British West Indies	86,321	117,918
Anglo-Egyptian Sudan ..	60,791	103,227
Other Commonwealth Countries	84,495	341,881
Irish Republic	260,151	169,685
Soviet Union	—	20,226
Finland	73,249	21,461
Sweden	248,703	155,898
Norway	157,709	84,478
Iceland	5,812	3,866
Denmark	102,213	102,254
Poland	7,450	10,509
Western Germany	63,223	37,076
Netherlands	160,151	274,805
Belgium	107,570	118,545
France	78,561	206,079
Switzerland	60,931	47,098
Portugal	71,325	94,937
Spain	94,904	58,448
Italy	75,859	114,031
Austria	16,950	18,759
Czechoslovakia	5,206	1,140
Yugoslavia	50,749	25,919
Greece	78,183	102,454
Turkey	186,314	75,785
Portuguese East Africa ..	11,120	7,551
Syria	28,131	17,757
Lebanon	44,346	22,307
Israel	31,119	44,680
Egypt	158,730	80,029
Arabia	24,852	43,848
Iraq	151,729	148,582
Iran	14,749	17,136
Burma	105,774	85,926
Thailand	26,669	65,415
Indonesia	54,247	29,186
China	3,421	838
United States of America ..	84,092	112,644
Colombia	23,376	36,315
Venezuela	60,342	90,725
Peru	42,455	20,975
Chile	20,215	7,791
Brazil	226,379	63,508
Uruguay	16,529	12,517
Argentine Republic	34,626	50,976
Other Foreign Countries ..	282,375	236,490
Total ..	7,920,365	8,309,869

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Dual-Purpose Steam

THE coal industry is known to be sick, but this is not the appropriate place to prescribe a remedy, even if one was in a position to do so. My first point is, therefore, that the coal which the National Coal Board produces must be made to go much further than at present if this country is to survive as a great industrial nation. In fact, Sir Hubert Houldsworth himself has emphasized this point repeatedly since he took over the chairmanship of the Board.

In the pamphlet "A National Fuel Policy," which was issued by the Federation of British Industries in February, 1952, it is pointed out that national coal consumption is likely to exceed national production by some 50 million tons in another ten years' time. Of this increase, 27½ million tons will be required by the B.E.A. to meet the demand necessitated by its programme of power station construction. This is one of the facts which is worrying fuel technologists.

An unrestricted supply of electricity is essential, and power station construction is not within sight of catching up with the ever-increasing demand. Were this otherwise, the National Coal Board could not supply the additional coal demanded by the present B.E.A. programme. The siting of new stations in the Trent Valley, for instance, where coal freight charges are low and cooling water plentiful, may well have been fully justified. However, although an increase to 26 per cent is forecast by 1960, the average thermal efficiency of B.E.A. stations to-day is nearer 22 per cent, and so, for some years to come, we must expect something of the order of three-quarters of the heat value of the coal delivered to the bunkers to be wasted. This state of affairs we simply cannot afford to accept as a nation. While it is true that a number of new stations are showing thermal efficiencies approaching 30 per cent, steam-turbines, while capable of further improvement, have reached a stage of development where major advances in overall economy are no longer probable. In spite of very high figures reported from America—approaching 37 per cent—perhaps we may look for 33 or 34 per cent, but it is a matter of economics to determine whether very high pressures and temperatures, or alternatively elaborate re-heat cycles, are worth while.

With back-pressure plant, the thermal efficiency of the prime mover is of no importance, provided that good use can be made of the latent heat in the steam which passes through it, and it follows that there is a strong case for examining the possibility of extending the use of such installations, not only for industrial schemes, but also in connection with future district heating developments. Assuming that there is a perfect balance between heat and power requirements, a coal utilization efficiency approaching 80 per cent can be reached with plants of this kind.

Conditions are not always ideal, but when requirements are out of balance much can be done by various means to contribute to a state of equilibrium. Among solutions, which may be whole or partial, should be included parallel-running with the grid, pass-out operation, steam or hot water storage, steam-jet vacuum refrigeration and export of current or steam to other premises.

As regards thermal-electrical stations for district heating schemes, little data has been published about Pimlico, but satisfactory results have been obtained at Brno in Czechoslovakia for some twenty years past. Surely much could be gained by trying out full scale experiments in such areas as the devastated sites in central Bristol or the City of London? Could not the B.E.A. distribute steam or hot water in suitable areas in addition to three-phase current? The Authority provides power and light, but why not also heat in another form?

It is not only in B.E.A. power stations that inferior fuels can be burned. Many large factories have similar water-tube

boilers, while owing to the rapid development of small mechanical stokers in recent years, even shell boilers " can take almost anything " without loss of rating. Efficiencies with the latter now often exceed 80 per cent.

Since the war, lack of finance has been the main reason for the slow progress with the extension of private back-pressure generation, but the revised Government loan scheme, of June this year, covering industrial fuel saving equipment should go far in redressing this state of affairs. Another hindrance in the past has been the attitude of the supply industry in the matter of stand-by charges.

JOHN FOX,
M.I.MECH.E., ASSOCIATE I.E.E., F.INST.F.
London, E.C.2.

Unremunerative Electrification

I AM gratified to note that my letter to you on the above subject does not meet with disfavour from Mr. Steward, and as no one took exception to his statements it can be deduced that all were in agreement. Moreover, my letter was not confined to rural electrification but to electrical development in general. After more than 50 years' experience in the electricity supply industry, I cannot share Mr. Steward's optimism as to the future results of a substantial programme of rural development.

The figures I quoted in my last letter take into account the many factors to which Mr. Steward refers, and any future improvement in diversity or load factor will arise from the sale of low-priced units on a two-part or off-peak tariff. With the purchase of bulk electricity at an average cost of 0·822d per kWh which, after allowing for the Boards' transmission and distribution losses, is increased to 0·87d per kWh, only a small margin is left when the kWh charge is 1·0d (or less).

Moreover, whilst the overall diversity or load factor may be increased because of non-coincident maximum demands there will nevertheless be additional demands requiring reinforcement of individual sections of the transmission and distribution systems, so that the margin of profit (if any) will be insufficient to cover the loss due to uneconomic development.

This is by no means a new factor in the industry; it is merely intensified by the more rapid development under the new organization and the addition (probably compulsory) of less remunerative business which was unattractive to the old organizations.

The question is, who should foot the bill?

FREDK. W. PURSE,
West Horsley. M.I.E.E., M.I.MECH.E.

Lamps for Street Lighting

MR. E. B. SAWYER is to be commended for having observed my slip in stating that the light output of a sodium lamp was of greater use than that of a h.p.m.v. lamp, owing to its monochromatic nature falling almost wholly on that part of the spectrum near to which the eye has its greatest sensitivity, and he has my thanks for having drawn attention to this. It is, of course, energy, and not lumen output, which does so.

I am glad to think, however, that my main arguments in favour of sodium remain unaffected by Mr. Sawyer's correction, and that my statement, and proof, that sodium costs nearly a fifth less than h.p.m.v. remains unchallenged, as do my reasonings regarding the more acceptable quality of light. A fact which I did not mention in my article was the reduced amount of glare, and more even light distribution, owing to the longer light source and horizontal mounting, compared with the h.p.m.v., a fact which is very evident, particularly at times when the roads are wet.

I have also been chided by my friend Mr. R. H. E. Ryley, London Electricity Board district engineer for Fulham, for the fact that the caption under the photograph of h.p.m.v. lighting says " Lilly " and not " Lillie " Road.

In conclusion, my conviction that, barring radical development of some other source, sodium is pre-eminent for the lighting of our traffic ways remains unshaken, and I anticipate that the use of h.p.m.v. for new installations will gradually decline.

F. H. PULVERMACHER.
Pentyrch, Glam.

Radio Control of Ambulances

The Brighton Town Council has decided to control its fleet of ambulances by radio. Pye Telecommunications, Ltd., is to supply the equipment for approximately £2,392, and maintain it for £263 per annum.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Ground-base Utensils

TWO additions have been made to the range of "Pyramid" ground-base utensils for electric cooking available from HAGUE & MCKENZIE, LTD., Pyramid Works, Sloane Street, Birmingham, 1. In a new porringer the diameter of the opening of both top and bottom pans is identical, so that the single lid can be used with either. For easy cleaning the former "bulge" seating is replaced by a simple "step." A 3 pint model costs 29s and a 5 pint model 34s 6d. A new shallow milk pan designed to ensure maximum coverage of the cooker hotplate and so be more economical and speedy in operation is listed at 15s 3d or, with fitted lid, 18s.

Link Testing P.F. Meter

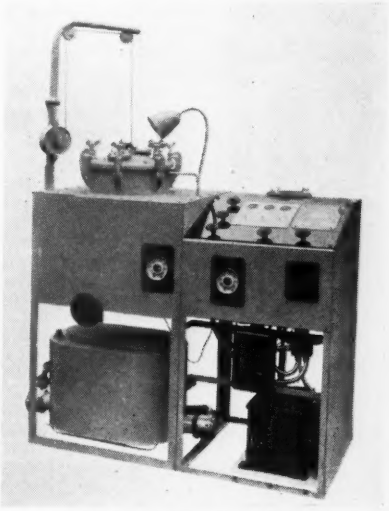
The range of link testing ammeters and wattmeters made by the GENERAL ELECTRIC CO. LTD., Magnet House, Kingsway, London, W.C.2, has been extended by the introduction of a link testing power factor meter. It follows closely the lines of the company's existing link testing instruments and comprises a link unit and plug-in indicator. The link unit has a hinged pole-piece which encircles a current-carrying conductor without breaking the circuit. Leads plug into the handle and enable the voltage component to be connected by shrouded crocodile clips.

The indicator, which is the same size as the ammeter and wattmeter indicators, plugs into the link unit and has two scales, 50 to 100 A and 100 to 250 A. Both scales cover the range 0·5 lagging to 0·5 leading and the scale length is 2·5in.

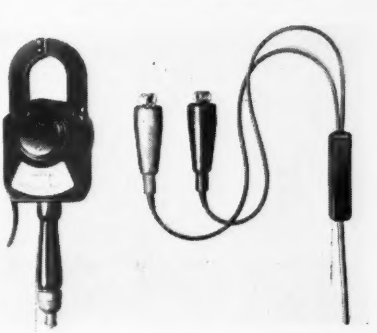
The indicator is a single-phase moving-iron instrument using a split-phase circuit and has three jack connections which plug into the link system. Standard ammeter indicators can also be used in the power factor links, so that an initial reading of current can be made to determine which scale on the power factor meter should be used. The standard links are suitable for use on conductors up to 1⅞in diameter, but larger ones will be available shortly.

Vacuum Impregnator

The new vacuum impregnator introduced by BLICKVAC, 505, Lordship Lane, London, S.E.22, is designed for production use, yet it has the dimensions and requirements of a laboratory unit. The overall dimensions are 4ft 6in long by 2ft deep by 3ft 6in high, with a chamber 14in in diameter and 14in deep. It is self-contained, requiring only a connection to the nearest single-phase supply point and the factory compressed air lines; a compressor can



Blickvac vacuum impregnator



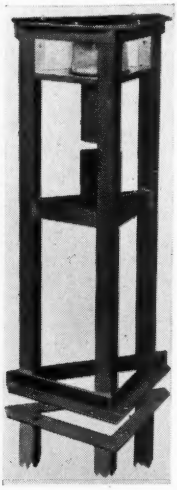
G.E.C. link testing power factor meter

be fitted if necessary. A feature of the equipment is its great flexibility. Coils are impregnated to R.I.C. specification 214 when using a good quality varnish.

The plant is in two sections, the autoclave unit and the control section. A tandem autoclave can be added to provide almost twice the output with only slight increase in cost, and further autoclaves may be connected and disconnected as required.

Dockside Bollards

A bollard for lighting the road and rail tracks of dockside quays has been introduced by the EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, London, W.C.2.



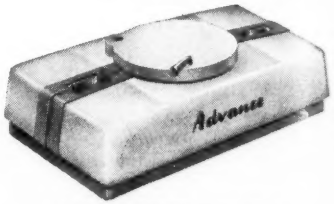
"Ediswan" dockside bollard

Risk of damage from crane loads is considered inevitable, so cast iron or concrete construction is not employed. The frame is made of 2in by 0·25in steel angle section material welded into a triangular cross section unit rising about 3ft high above ground. The lamp compartment is virtually water- and dust-tight and comprises a prismatic dome refractor semi-permanently clamped on a gasket to the underside of the lid, which is bolted to the perimeter flange at the top of the bollard. Leadscrew type lamp focusing adjustable by an external control is provided to ensure that the best use is made of the refractor. The lamp compartment is readily adaptable to the use of horizontal tubular light sources employing flat prismatic plates.

Magnetizing Unit

The K1 magnetizer made by ADVANCE COMPONENTS, LTD., Back Road, Shernhall Street, London, E.17, is a portable equipment for processing permanent magnets. It is particularly suitable for ring magnets such as those used in loudspeakers, and for focusing cathode-ray tubes, although short bar and block magnets of the type used in meters can also be accommodated. Sufficient ampere turns are available to saturate magnets up to 1in long in all the materials that are at present used in the above applications.

The magnet is placed in the air gap of a symmetrical iron circuit which is then magnetically saturated by passing a heavy current through an associated multi-turn winding. The large peak power required for this purpose is obtained



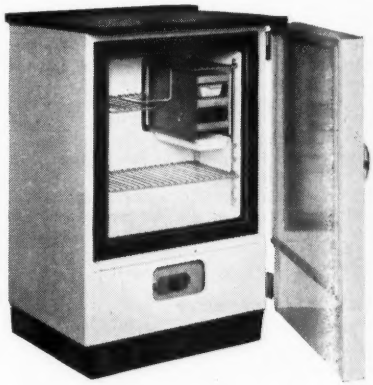
Advance Type K1 magnetizer

by discharging a capacitor, thus enabling the equipment, which is self-contained, to operate from standard mains supplies with a consumption of only 30 W.

The space available for magnets to be processed is 3½in in diameter by 1⅝in long, but the length of the magnetic material should not normally exceed 1¼in. The overall dimensions of the equipment are 23in long by 10in high by 13in wide and the weight is about 140 lb.

Refrigerator

A 2 cu ft table top absorption type refrigerator is to be marketed by EASICLENE PORCELAIN-ENAMEL (1938), LTD., Darlaston. It is available either in white with grey table top and white interior porcelain enamelled or in cream with green table top and green interior. The plinth, edges, surround, etc., are black in each case. The plastic covered table top is stain and burn proof. The price is £47 17s 5d (plus £19 12s 7d purchase tax in this country).



Easiclene 2 cu ft refrigerator

Pottery Decorating Kiln

New Intermittent Electrically Operated Unit in Use at Longton Works

A NEW type of intermittent electrically fired pottery decorating kiln, developed by the Midlands Electricity Board in co-operation with Spencer Stevenson & Co., Ltd., manufacturers of chinaware, Chelson Street, Longton, Staffs, has successfully passed exhaustive practical tests after experimental installation five months ago. The kiln has been designed by Mr. S. Scholefield, of the North Staffordshire Sub-Area of the M.E.B., at the request of Mr. Spencer Stevenson, managing director of the company, who asked for a modern decorating kiln which could be installed at a low price.

The installation consists of twin box-shaped kilns, each 2ft wide, 4ft 6in long and 3ft 6in high, which are set side by side and used alternately, one being loaded or unloaded while the other is being fired.

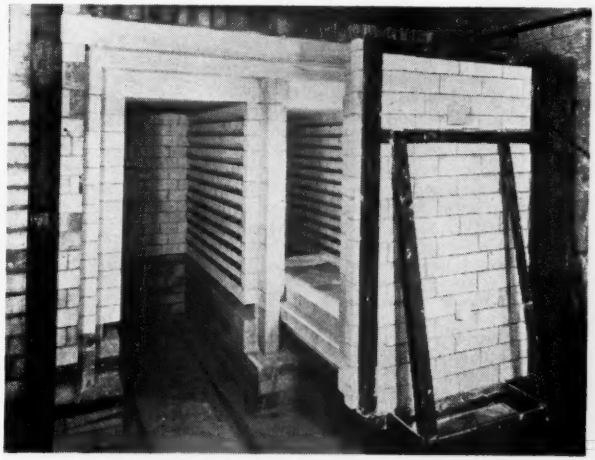
The capital outlay was about £1,000, compared with over £3,000 for an electrically fired continuous tunnel kiln of comparable output.

The installation has many new features which give it advantages over the existing single kilns of its type. Each of the twin kilns is fed by a truck, running on rails, on which from 60 to 70 dozen pieces of ware can be placed, and a self-sealing, labyrinth-jointed brick door is built on to each truck, eliminating the need to seal the door of the kiln with clammings.

Firing is regulated by a simple electronic controller which is pre-set to the required temperature and the danger of over-firing is avoided by an automatic cut-out device. The control gear ensures that only one kiln at a time is switched on, and gives the twin installation a load factor approaching 100 per cent, with consequent low electricity cost. The firing, at temperatures ranging from 650 deg to 750 deg C according to the position of the ware on the furniture of the truck, is on a six-hour cycle, which permits each truck to be loaded once every 24 hours.

The traditional skill is required in placing the ware on the trucks but afterwards it is only necessary to roll the truck on its rails in and out of the kiln, an operation which is performed at night-time, as required, by a watchman. The twin kilns operate continuously seven days a week and have a capacity of 2,000 dozen pieces weekly.

The maximum demand of each kiln is 27 kW, the average consumption on a six-hour cycle being 155 kWh at 0·9d/kWh. This electricity consumption in the firing of 60 to 70 dozen pieces of ware compares with



Twin intermittent electrically operated decorating kiln at the works of Spencer Stevenson & Co., Ltd.

30 cwt of coal at £3 9s 10d/ton used in firing 300 dozen pieces in the traditional decorating kilns, two of which are still in use at the factory. In other words, electrical fuel costs are 55 per cent of solid fuel costs.

Fuel efficiency is admittedly lower than with the continuous tunnel kiln, but against this has to be set the ease of maintenance and the flexibility of the installation, which can be shut down or used continuously as required by the flow of work.

Mr. Stevenson, who has had forty years' experience in the pottery industry, is well satisfied with the new installation. He proposes eventually to have a battery of six of the new decorating kilns, as the work of reconstruction of the firing methods continues. He also hopes that the kilns can be adapted to glost and biscuit firing. He says that with tunnel kilns there is always the human element to be considered. Also they are initially costly and need a great deal of ware to keep them fully occupied. The new twin kilns can be shut down more economically: shutting down a tunnel kiln for a holiday is a five-day job, against about five hours with these. Moreover the electric kilns give the ware a better "soak," which improves the solidity of the pattern, brings out the best colours and makes the decoration more durable. Another advantage is that the temperature setting can easily be altered for special jobs and, if needed, for part of the production.

Emphasizing the small space required, Mr. Stevenson points out that the two kilns now in use occupy only a small area in what was once an air-raid shelter; the other four will be fitted into a small adjacent packing room. Other advantages are that the continuous kiln requires three eight-hour shifts and with the new kilns the life of the furniture is increased because of the comparative absence of movement.

Mr. Scholefield shares Mr. Stevenson's belief that the new kilns can be adapted to provide the higher temperatures required for glost firing and probably, with modifications, for biscuit firing. During the August holidays it is proposed experimentally to take the new kilns up to the glost temperature of 1,080 deg C.

Mr. H. A. P. Caddell, manager of the North Staffordshire Sub-Area of the M.E.B., says it is believed that this development will be of particular advantage to the smaller pottery firms, many of whom are at present reconstructing their factories and require equipment of this kind, which is efficient but which involves a low capital cost and is economical in space.

Power System Protection

A SUMMER school on power system protection was held in the Department of Electrical Engineering and Physics of the Borough Polytechnic, London, from 20th to 29th July. The unusual feature of this course was that it provided a wide range of laboratory experiments covering the main aspects of system protection and about twenty-five representatives from the B.E.A. and various manufacturers attended. Tests were selected to demonstrate the principles of operation and the actual performance of protective equipment and also the performance of the power circuit under fault conditions. Attention was also devoted to modern systems using transductor and phase comparison methods.

Specially developed equipment was available for examination of relay time characteristics which incorporate means of controlling the cyclic initiation point. Cathode-ray oscilloscopes were also to hand and where photographic records were taken these were developed and returned to members of the school. Experiments were allocated with reference to the branch of the subject with which the students were concerned. Some of the topics included synchronous generators, transformers, fault calculation, arc phenomena, current transformers, relays, protective systems and arc suppression. In addition to the experimental work visits were arranged to the B.E.A. research laboratories at Leatherhead, Surrey, to the L.E.B. control room and to Battersea power station.

I.E.E. Supply Section

THE Supply Section of the Institution of Electrical Engineers will be holding its annual summer visit in Porthcawl, South Wales, from 24th to 27th September next. The programme will include visits to the Llandarcy Oil Refinery, the Abbey Steel Works at Margam, the Metal Box Co. at Neath, a colliery and a woollen mills. Further details may be obtained from the secretary of the Institution.

COMMERCE and INDUSTRY

British Employers' Confederation and F.B.I.

Belfast Power Plant Contracts

IN 1946 the British Employers' Confederation and the Federation of British Industries adopted resolutions accepting fusion in principle. A joint committee was appointed to prepare a complete scheme acceptable to both for this purpose. Since that time the joint committee has carried through exhaustive discussions with a view to working out a practicable scheme which could be recommended to the two organizations.

The joint committee now considers that the increased work of the two organizations and the different character of the problems with which they deal would inevitably result in the administration of any fused body being very cumbersome. It has therefore recommended the two bodies not to proceed further with the fusion and considers that the interests of British industry will best be served by maintaining in existence two separate organizations, working closely together, but each responsible for handling matters which fall within its respective province. The committee's statement has been adopted at separate meetings of the two organizations. In 1945, in order to facilitate subsequent fusion, it was arranged that the British Employers' Confederation should move its offices to 21, Tothill Street, Westminster, S.W.1, the headquarters of the F.B.I. As the circumstances no longer obtain the B.E.C. has decided to establish its offices at a new address in the near future.

Wagon Tipplers for Steelworks

Fraser & Chalmers Engineering Works of the General Electric Co., Ltd., are to supply two of their new side discharging weighing type wagon tipplers to the order of the South Durham Iron and Steel Co., through Ross Engineers, Ltd. The tipplers will be of special design for weighing and tipping wagons of 60 tons gross load, but in this instance will handle ore wagons containing a maximum of 31 tons and will have a gross weight not exceeding 45 tons. The drive for one machine will be provided by an a.c. 85 h.p. 730 r.p.m. totally enclosed fan-cooled slipring induction type motor, while the drive for the second machine will be provided by a modified Ward-Leonard system to enable the 110 h.p. 500 r.p.m. d.c. mill-type tippler motor and the Ross wagon haulage motors to be operated from one set. The proposed capacity range of the two machines is that one should discharge a total of 20 wagons per hour, equivalent to 490 tons per hour from 24½ ton capacity wagons, while the other will discharge 32 wagons per hour, equivalent to 784 tons per hour from wagons of similar capacity. The hoisting gear will be electrically controlled.

Contract Price Formulæ

The British Electrical and Allied Manufacturers' Association has issued the figures for its contract price adjustment formulæ. In each case the rate of pay for adult male labour at 18th July is deemed to be 141s 6d. The "cost of material" figures are as follows:—

For electrical machinery and equipment: the Board of Trade index figure published on 18th July is 150·8.

For turbo-generating and allied plant: materials used in mechanical engineering industries, 143·1; blast furnaces and iron and steel smelting and rolling (40 and 41), 144·5; price of ⅜in o/d 18 s.w.g. brass condenser tubes (*Metal Bulletin*, 17th July), 3s 8¼d per lb.

Outstanding contracts covered by the Board of Trade intermediate products index: the index figure for intermediate products (18th July) is 355·4.

Engineers' Guild

An invitation has been extended to members of the Engineers' Guild who may be visiting the Scottish capital during the Edinburgh Festival of Music and Arts to meet Scottish Branch members. To avoid interference with visitors' plans, the welcome will be informal, consisting of a cocktail party at which the hosts may meet their visitors, and visits to works and plants which may be individually arranged between members. Members of the Guild who expect to be in Edinburgh between 23rd August and 12th September are asked to communicate with Mr. C. M. Beckett, 8, House o' Hill Row, Edinburgh, 4 (Edinburgh: 77785), so that details of the arrangements, which will be finally made to suit the majority of visitors, can be sent to them.

Marine Diesels for Burma

National Oil Engines (Export), Ltd., the export sales organization of the National Gas and Oil Engine Co., Ltd., has received a £396,000 order from the Government of Burma. It is for propulsion and auxiliary machinery for fifty-six creek class single screw motor vessels

for service with Burma Inland Water Transport Department in the Irrawaddy delta. Propulsion engines will be National four-cylinder marine diesels developing 200 b.h.p. at 600 r.p.m. The auxiliary sets each comprise a Petter two-cylinder diesel engine developing 18 b.h.p. at 1,500 r.p.m., driving a Hamworthy compressor, an 8 kW generator and a centrifugal pump. In addition there will be emergency 3 kW generating sets, driven by Petter single-cylinder, water-cooled diesel engines.

Delivery of the first complete set of equipment has been undertaken in four months from the signing of the contract, which will be completed in twelve months.

Factory Equipment Exhibition

The second National Factory Equipment Exhibition will be held at the Royal Horticultural Society's Halls, Westminster, from 22nd to 26th March next. The exhibition will be sponsored by the *Factory Manager* and *Factory Equipment News*. The exhibition organizer is Mr. J. E. Holdsworth, 117, Kingsway, London, W.C.2.

Mining Engineers Visit Preston Works

Members of the Institution of Mining Engineers, who were holding their summer meeting in Manchester by invitation of the Manchester Geological and Mining Society, were the guests of the English Electric Co., Ltd., when they visited the Preston Works and the Samlesbury aeronautical establishment on 16th July. The visitors, who were welcomed by Mr. W. Shorrock, manager, Preston Works, inspected diesel and diesel-electric locomotives for both overseas and British Railways and also took a keen interest in the company's aircraft activities, which included a Canberra routine test flight, at Samlesbury. During luncheon at the Station Hotel, Preston, Mr. Shorrock referred to the company's extensive work in the traction and aeronautical fields, examples of which they were seeing that day. After thanking the company for its hospitality, Mr. F. G. Glossop, production director, National Coal Board, North Western Division, mentioned the English Electric dual-fuel diesel installation in course of manufacture for the Point of Ayr Colliery, which other members were that day visiting.

British Engineers' Association Handbook

The 1953 edition of the "Classified Handbook of Members and their Manufactures," published by the British Engineers' Association, is now available. It includes a list of the Council and officers of the Association and forms a comprehensive guide to manufacturers of engineering products. There is an alphabetical list of members, with their addresses and manufactures, a classification of members' products by trade headings, and a list of trade names and marks of some of the members.

Display Carton for Fire Spirals

Metway Electrical Industries, Ltd., have recently issued an attractive new display carton containing six 1,000 W, four 750 W, and two 600 W fire spirals. Other packs containing different proportions of the various loadings are also available.

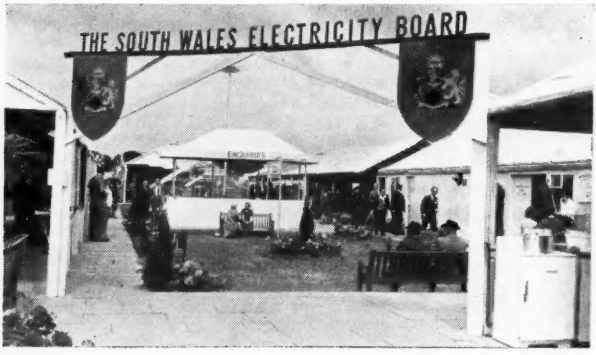
Royal Welsh Show

Speaking last Friday at a dinner held on the South Wales Electricity Board's stand at the Royal Welsh Show at Cardiff, Mr. L. Howles, the chairman of the Board, said that this year's show had come at a time when the Board had been able to announce that its capital expenditure on rural development during the year 1953/54 would be in the region of £900,000, while £2,000,000 would be spent in the same year on other essential works connected with mains improvements, etc.

This estimated expenditure would be double that spent the previous year and the money would be used to secure the fullest possible service to the rural areas, in accordance with the recent statement made by the Minister in the House, which had given great encouragement to the industry.

Replying on behalf of the National Farmers'

A general view of the stand at the Royal Welsh Show held at Cardiff, arranged by the South Wales Electricity Board and the British Electrical Development Association



Union, Mr. Sylvan Howell thanked the Board for its declaration of policy connected with rural electrification and hoped that everything possible would be done to realize the Board's promise. He in turn promised to encourage the farmer to make full use of the supply once it became available as Mr. Howles had emphasized that only this would permit of more rapid expansion to the rural areas.

Handicrafts Exhibition

The first International Handicrafts, Homecrafts and Hobbies Exhibition to be organized in Britain will be held at the Empire Hall, Olympia, from 1st to 10th October. It is being sponsored by *Popular Handicrafts Magazine* and its scope is world wide. The exhibition is being organized by Mr. J. Pullan, International Handicrafts, Homecrafts and Hobbies Exhibition, 25a, Cockspur Street, S.W.1 (Whitehall 1345).

Engineering Wage Claim

At a meeting of the Negotiating Committee of the Engineering and Allied Employers' National Federation and the Executive of the Confederation of Shipbuilding and Engineering Unions last week, Mr. Jack Tanner formally presented the Union's claim for a 15 per cent increase in the consolidated time rates of all grades of adult male workers. The employers agreed to consider the claim.

B.E.A. Air Terminal

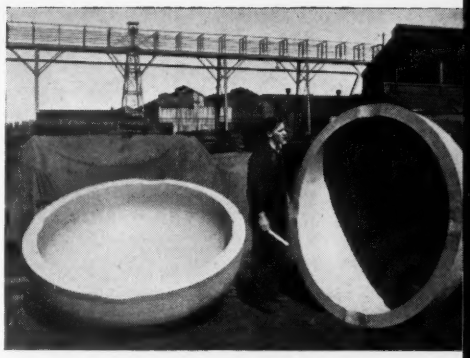
The application of electric panel heating to provide local comfort conditions is well exemplified in an installation of "Medrae" panels recently completed by Troughton & Young (Heating), Ltd., at the new British European Airways air terminal at Waterloo. To supplement the general hot water heating system forty-seven 47¾in by 23¾in and three 23¾in square panels are fixed to the ceiling over the counters, with thirty-nine 23¾in by 11¾in units fitted vertically on the back of the knee holes of the desks. All the ceiling panels are rated at 30 W/sq ft and the desk panels at 75 W/sq ft.

Leeds Railcars

It has been pointed out to us by Crompton Parkinson, Ltd., that the Leeds Corporation railcar No. 602, described in our issue of 17th July, is one of two experimental railcars now being tried out for the purpose of deciding which may be adopted as the standard for future development. We regret any inadvertent implication that this railcar has in fact already been adopted.

Drumheads for Castle Donington

The accompanying picture shows two of the forgings for the drumheads of the Castle Donington boilers, made in the Renfrew works



Forgings for the drumheads of the Castle Donington boilers made by Babcock & Wilcox

of Babcock & Wilcox, Ltd. Designed for a working pressure of 1,600 lb/sq in, these forgings are 4in thick and 6ft 2in in diameter.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton £150 0s 0d
COPPER, H.C. Electro	ton £252 0s 0d
Fire Refined 99·70 per cent ..	ton £251 0s 0d
Fire Refined 99·50 per cent ..	ton £250 0s 0d
COPPER Tubes	lb 2s 4½d
Sheet	ton £305 10s 0d
H.C. wire and strip	ton £281 10s 0d
LEAD, English	ton £93 10s 0d
Foreign	ton £92 0s 0d
MERCURY	flask £70 10s 0d
TIN	ton £566 0s 0d
ZINC, G.O.B. Foreign	ton £71 0s 0d
Electrolytic	ton £72 10s 0d
BRASS Tubes	lb 1s 11½d
Sheet	ton £244 15s 0d
Wire	lb 2s 6½d
PHOSPHOR BRONZE	
Wire	lb 3s 9½d
RUBBER, No. 1 R.S.S. spot ..	lb 18¾d–19d

Iron and Steel Prices

The Minister of Supply has made the Iron and Steel Prices (No. 4) Order, 1953, which removes from price control certain iron and steel products, including cold drawn tubes, malleable iron pipe fittings, and wire and wire products. In addition the Order reduces by 7s 6d per ton the maximum permitted price of heavy steel products delivered to South Wales.

Midland Electricians' Strike

An inter-union dispute which has resulted in members of the Electrical Trades Union employed at the Midlands Electricity Board installations depots coming out on strike was described last week as an attempt to force an

E.T.U. closed-shop at the expense of another union, the National Union of General and Municipal Workers. Between 200 and 250 E.T.U. members were involved in the dispute, which arose over the refusal of E.T.U. members to take orders from a member of the N.U.G. & M.W. who once every sixteen weeks takes over the duties at Dale End as a temporary chargehand.

Mr. Emil Braathen, manager of the Birmingham Sub-Area of the Midlands Electricity Board, said that if he acceded to the request of the E.T.U. that the man should be omitted from the temporary chargehand rota he would be penalizing the chargehand, who was fully competent to carry out the duties. Moreover, the Union to which he belonged could and would be entitled to bring a case which he (Mr. Braathen) would be unable to defend. The men decided to return to work last Monday.

Belfast Plant Contracts

At a meeting of the Belfast City Council on Monday the decision of the Electricity Committee not to advertise after all for tenders for new equipment for the West power station was confirmed. It will be recalled that the Committee originally agreed to place contracts with C. A. Parsons & Co., Ltd., for two 60 MW turbo-alternators, etc., for £1,470,593 and with Babcock & Wilcox, Ltd., for seven boilers and ancillary equipment at a cost of £2,976,496. Quotations had been invited from selected manufacturers on the advice of the consulting engineers. Subsequently Mitchell Engineering, Ltd., intimated that had the company been invited to tender for the boilers its figures would have been about 10 per cent lower than those usually quoted by members of the Water Tube Boiler Makers' Association. The Committee, at a meeting on 25th June, decided by five votes to four to rescind its earlier resolution and recommend the Council to invite tenders by public advertisement. This decision was conveyed to the Minister of Commerce from whom a letter was received stressing the urgency of the plant extensions. A further letter from the Permanent Secretary to the Ministry on 10th July underlined this point and also added that the Minister felt constrained to emphasize the view that the advertising of a contract after disclosure of the amount of the lowest tender received would be a course much to be deprecated. The matter again came before the Electricity Committee on 16th July, when it was decided by eight votes to two to adhere to the original contracts.

Co-operation between Fuel Users

A suggestion that there should be co-operation between the different fuel industries at consumers' level so as to effect economy in the use of the fuels was made last week by a member of the South Wales Electricity Consultative Council, Mr. E. T. Kinsey Morgan (Rhayader). At a meeting of the Wales Gas Consultative Council, of which he is also a member, he said there was for the consumer "very little access" to the Ministry of Fuel and Power, and he was wondering whether something could be formed representative of the consumers of gas, electricity, etc.

He was perturbed, for one thing, at futile competition between the fuels. He contended that a "wastage" resulted through, say, gas and electricity both being used in certain services. He did not want to eliminate competition, but sought to get the best use of fuels by avoiding unnecessary duplication.

Trade Announcements

Mr. F. L. Platt, 215, Congleton Road, Butt Lane, Talke, Stoke-on-Trent, has been appointed to represent **Hirst, Ibbetson & Taylor, Ltd.**, in South Cheshire.

Mr. B. I. Nealon has joined the Thermovent Heating Division of **E. K. Cole, Ltd.**, as technical sales representative. He is operating from the company's Birmingham depot at 11, Brook Street, and is covering the Midland counties.

Electro Methods, Ltd., have moved to Caxton Way, Stevenage (telephone : Stevenage 780/1).

Catalogues and Lists

Turners Asbestos Cement Co., Ltd., Trafford Park, Manchester, 17.—Three data leaflets relating to ebony and natural grade "Sindanyo" asbestos cement boards and "Siluminite" synthetic resin bonded asbestos paper sheet material.

Courtney, Pope (Electrical), Ltd., Amhurst Park Works, Tottenham, London, N.15. —Illustrated leaflet covering the "Petite" and "Gimbaliter" range of adjustable spotlight fittings.

Blick Time Recorders, Ltd., 96-100, Aldersgate Street, London, E.C.1.—Illustrated leaflet announcing the new Blick "Autoclip" time recorder.

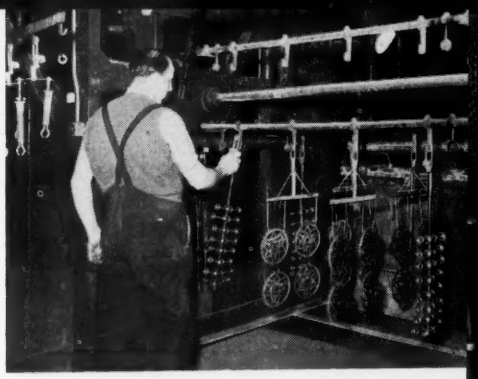
Automatic Telephone & Electric Co., Ltd., Strowger Works, Liverpool, 7.—Illustrated brochure dealing with a certified staple shaft mine signalling system (1200).

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, London, E.C.4.—Five illustrated catalogues featuring the "City" street lighting lantern (1024), the "Cathay" lantern (1025), the "Capital" lantern (1029) and infra-red lamps for pig breeders (1027) and infra-red lamps for chick rearing (1028).

International Combustion, Ltd., 19, Woburn Place, London, W.C.1.—Four publications dealing with the "L" stoker (S.535), "Usco" plate type air heaters (W.537), industrial grinding (G.525) and a general booklet (P.531).

Making Bicycles

Electricity as an Aid to Mass Production

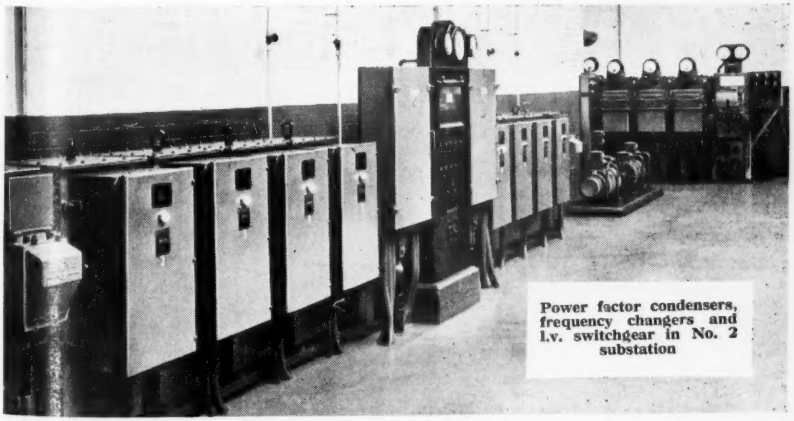


Loading jigs on to racks preparatory to nickel-plating

THERE are several thousand operations concerned in the manufacture of the modern bicycle. At the factory of Raleigh Industries, Ltd., at Nottingham—one of the largest and most progressive in the country—the adoption of electrical methods has advanced to such an extent that roughly about 90 per cent of these operations involve the use of electricity for some purpose or other, whether it be for mechanical handling, sheet metal work, machining operations, heat treatment, forging, plating, polishing or paint spraying and drying, not to mention, of course, lighting. A further indication of the extent to which production is dependent on electricity is provided by the fact that the factory has a maximum demand in the region of 7,000 kVA and a total annual consumption of 21 million kWh.

In this article we propose to describe some of the applications of electricity to the manufacture of the various components. A subsequent article will deal with operations involved in assembly, for which a separate new factory extending over 10 acres has just been completed. This new factory, which has not yet been fully equipped, will enable the company to increase its output considerably.

In this description we shall endeavour, as far as possible, to keep to the logical sequence of operations but it will be appreciated that a certain amount of diversion is inevitable in view of the fact that some components or sub-components require a particular specialized treatment while others have to be dealt with in different ways. Furthermore, the various component parts and sub-assemblies are



Power factor condensers, frequency changers and l.v. switchgear in No. 2 substation

constructed in different blocks of the factory and converge by various routes towards the main assembly line.

Perhaps a general idea of the layout of the factory, as well as of the relative importance of electricity to the various operations, can be obtained by a brief survey of the electrical distribution scheme. Duplicate 11 kV supplies from the East Midlands Electricity Board are at present received at seven interconnected substations so arranged as to minimize fault current in any particular section.

No. 1, which is equipped with three 750 kVA, 11 kV/400 V transformers, serves the automatic machine shop, the engineering section and part of the plating shop, while No. 2 (four 750 kVA transformers) covers the hardening shop, the buffing and glazing shop, the tube, frame and wheel shops, the rim plant and the tube mill. Part of the press shop is fed from the two 500 kVA transformers in substation No. 3; the remainder of the press shop, together with the forging department, the main plating department, some of the heat treatment furnaces, the turnery and the enamelling shop, is served by No. 4 (three 750 kVA transformers).

The head office and service department supplies are handled by a single 500 kVA transformer in substation No. 5, while No. 6 (three 750 kVA transformers) copes with the whole of the requirements of the dyno-hub department. The new assembly factory will be served by three 750 kVA transformers in substation No. 7, to which we shall refer in greater detail in our second article. An eighth substation in course of construction to serve a new press shop, an extension of the tube mills, etc., will be equipped with two 750 kVA transformers. The transformers used are mainly of Brush and Hackbridge construction with Reyrolle, Brush and English Electric high voltage and low voltage switchgear.

Also housed in the substation are power factor correction condensers, which are claimed to have achieved a power factor of 0·9 (lagging), and frequency changers for the operation of 200 c/s tools employed in many departments.

Possibly the most striking feature of the main press shop is the multiplicity of pressing operations interspersed with annealing which some of the components have to undergo. Bottom brackets, for instance, require no fewer than twenty-three pressing operations, together with six or seven treatments in an annealing furnace. Similarly, a hub shell requires twenty pressing and three annealing operations.

Altogether there are about four hundred presses of all kinds in this department. At present most of these are driven through countershafting by three 100 h.p. Metrovick slipring motors but there is a general tendency to change over to individual drive whenever the opportunity presents itself. Several of the larger presses are automatic in their operation and are equipped with Ward-Leonard variable speed control.

Conveyors carry the pressed articles to the three continuous annealing furnaces which are of the "Birlec" bright annealing type involving the use of an inert gas. Each furnace, which is loaded at 175 kW and operated at 400 V through Hackbridge transformers, is divided into three zones, the maximum temperature reached being 920 deg C. Operations are controlled by means of Cambridge recorders and regulators working in conjunction with Watford contactor relay gear.

Many of the smaller components are produced in very large quantities by the agency of high-speed automatic machines, of which there are altogether about 200 situated in two shops and each driven by its own individual motor. Forging machines, also individually driven, are found to be of special value for making parts of three-speed gears, etc.

The three-speed gears, as well as the sprockets, free wheels, pedal spindles, etc., are all treated in "Efco" 50 kVA cyanide case-hardening furnaces operating at a maximum temperature of about 900 deg C. Wild-Barfield tempering furnaces are used for treating cutting tools employed in the

(1) In the press shop the machines are gradually being changed over to individual drive. Here the two outside machines have already been converted, leaving the centre one still driven from the countershafting. (2) Forging machines, individually driven, are found to be of special value for making parts of three-speed gears, etc. (3) Three-speed gear parts, sprockets, free wheels, pedal spindles, etc., are treated in 50 kVA cyanide case-hardening furnaces. (4) The entrance to one of the 175 kW bright annealing furnaces in which all the pressed components are treated. (5) De-brassing tanks remove surplus brass from the frames, etc., after brazing. (6) Spot welding the stays on mudguards

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factory. A gas carburizing furnace utilized for case hardening bearing components for the Sturmey Archer gear hub, etc., where a deeper case is required, has been equipped by the Raleigh staff with electrically operated pushing mechanism.

In the tube shop such operations as the preparation of the frames, handlebars, front forks, etc., depend on the use of electricity for, among other things, bending, drilling and shot blasting. In the course of manufacture of the frames, the various components are assembled in jigs, drilled and pegged ready for brazing. After dipping in molten brass with which borax is mixed, the frames are electrically treated for the removal of surplus brass. The de-brassing tanks, which operate at 6 V with a current of 900–1,000 A, act in the opposite way to plating, the process being designed to remove instead of deposit metal: the operation is so gentle and easily controlled that there is no fear of too much of the brass being removed and so weakening the joint.

A specially interesting feature of these vats, which were supplied by W. Canning & Co., Ltd., and are fed by "Westalite" rectifiers, is that the busbars, instead of being carried overhead in the normal way, have been taken beneath with "Tufnol" spacing pieces and compound filling. The whole units are raised slightly from the floor by brickwork, the concrete being laid on top of the compound.

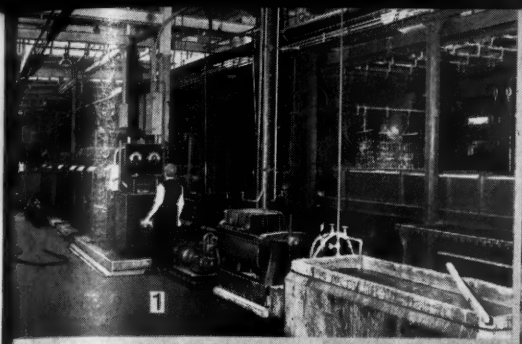
A rolling operation is employed for the production of mudguards, the stays being spot welded by means of 15 kW and 25 kW Holden & Hunt machines.

Articles such as handlebars, hubs, gear wheels, seat pillars, etc., which require plating are collected from the conveyor system in the glazing department. Here about sixty Canning machines prepare the surface for electrodeposition. Most of these machines are of the double wheel type driven by 3–5 h.p. motors, but there are also a number of special devices for handling particular items such as gear wheels (in which the gear wheel is held in position by a 50 V d.c. magnet and the mop oscillates) and seat pillars (for which a centreless glazing machine is used). After glazing, the articles, wired together in the case of the smaller items, are placed on jigs and taken again by conveyor to the plating department. Here the jigs are in turn transferred to racks which are picked up automatically by the conveyor feed mechanism of the continuous plating vats. In the two nickel-plating vats available the articles to be treated first pass through an electrolytic metal cleaning bath containing stainless steel anodes and operating at 6 V, 1,000 A. Two water rinses are followed by etching at 7½ V, 1,000 A, in concentrated sulphuric acid, the articles in this case acting as the anodes. After two further rinses the articles pass into the nickel tank which is 40ft long and contains 3,800 gal of solution. The racks, each of which holds four jigs, travel at a rate of 1ft/min so that there is a 40 minute deposition cycle: the voltage used here is 4 V at 6,000 A. Rinses in cold and hot water are followed by drying in a continuous oven, the articles then being lifted off the racks and returned to the conveyor system.

For chromium-plating there are also two continuous vats, both 18ft long, but one with 2,800 gal solution capacity for general articles and the other with a 1,400 gal solution capacity for handlebars. Here the articles, after previous nickel-plating, receive two rinses before being immersed in the chrome solution. In this case the current is 1,100 A at 5 V and the deposition time is for the general articles 7 minutes and for handlebars 6 minutes. An evaporator is provided to recover the chrome by the "drag-out" process. After deposition the process is completed by four rinses in cold and hot water and a soda neutralizer. For very small articles such as nuts, bolts and washers, etc., continuous plating barrels are employed. All the plating equipment is of Canning manufacture with the exception of the small chromium unit which was supplied by the Electro-Chemical Engineering Co., Ltd. Westinghouse "Westalite" rectifier equipment is installed throughout.

A further sixty machines similar to those used for glazing are employed after plating

(1) A general view of one of the nickel plants. (2) Continuous plating barrels are used for the very small articles. Note the section of conveyor system above. (3) A portion of the shop where articles are buffed after plating. (4) One of the dust extraction units serving the glazing and buffing shops. (5) The special nickel-plating vats for rims incorporate central anodes with provision for the rims to revolve. (6) Special machines for glazing and buffing rims. (7) Photo-electric device for counting handlebars as they pass along on a conveyor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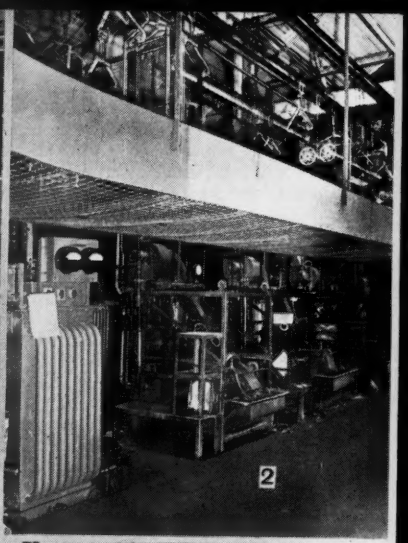
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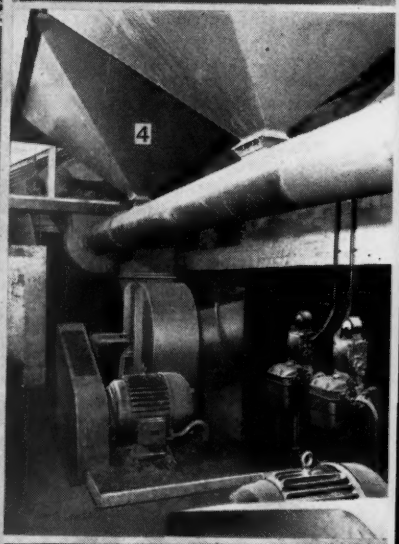
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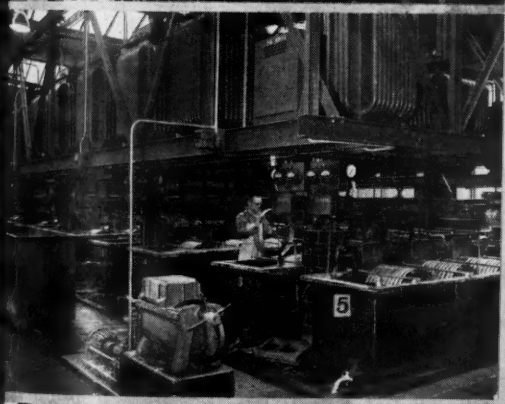
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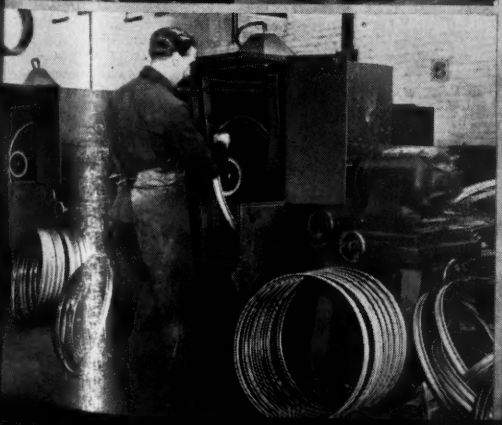
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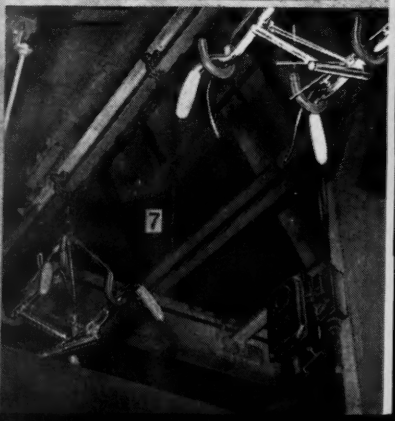
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for buffing the articles which are then carried away to assembly or store. Serving both the glazing and buffing shops, which are adjacent, is a powerful dust extraction plant, comprising six Keith Blackman fans driven by 25 h.p. Hopkinson motors with Geo. Ellison starters. A small additional fan driven by a 5 h.p. motor collects the dust at one end of the trunking system, an interlocking device preventing any of the larger fans being started up before this small motor is in operation. Incidentally, all the metalwork for the dust extraction plant was carried out by Raleigh's own sheet metalwork department.

A separate plating department deals exclusively with rims. Here a novel feature of the special nickel-plating vats is the incorporated central anode, with provision for the rims to revolve: the process is designed to take about an hour with 5½ V, 1,200 A applied to each vat. In the high-speed chromium-plating plant (operating at 5½ V, 1,500–1,800 A) the desired deposit can be achieved in six minutes, timing being carried out with the aid of a visual warning device. Special machines developed for glazing and buffing the rims at an angle have a 25 h.p. motor driving a spindle at each side. One operator looking after three machines can deal with a thousand rims a day.

Bonderizing is employed as a rustproofing process for all components such as frames, forks, mudguards, etc., which are to be enamelled. In this latter process all components first receive a coat of black enamel, which is applied by dipping, and are then stoved in a high temperature oven. Subsequent colour finishes, generally two coats, are sprayed on with the aid of a Broom & Wade compressor driven by a 35 h.p. G.E.C. motor. To ensure ready detection of any blemishes high intensity fluorescent lighting has been provided in the enamelling section and also in the chromium-plating inspection department.

The conveyor system, to which we have briefly referred, is employed throughout the factory to carry components between and during processes, to take them to the finished component stores for issuing as required, and finally to aid assembly, inspection and dispatch. The extent to which manual handling has been eliminated can be judged by the fact that there are altogether 5¼ miles of conveyor in service involving the use of 65 electric motors. Apart from the saving of manual effort the conveyor system also provides the means, in conjunction with G.E.C. photo-electric cells, of counting components as they are completed, the results being transmitted to the works manager's office.

Development of Inter-State Rivers

THE United Nations Economic Commission for Europe reports that sixteen countries attending its Electric Power Committee's recent session adopted unanimously a recommendation to overcome difficulties which might arise from the development and utilization of rivers of interest to two or more countries. Under the recommendation " a State proposing to embark within its own territory on projects likely to have serious repercussions on the territory of other States, whether upstream or downstream, should first communicate to the States concerned such information as would enlighten them as to the nature of these repercussions." This communication would be " calculated in particular to permit the opening of negotiations between the parties " in the interests of the harmonious hydro-electric development of " successive " rivers in Europe.

The recommendation, while addressed to European Governments, is also to be referred to the United Nations Economic Commissions for Latin America and for Asia and the Far East because of its usefulness to under-developed countries. The Committee requested the secretariat to continue studies on harnessing " contiguous " rivers (those forming a common boundary between two or more countries) and to prepare a supplementary study and analysis of most recent agreements in this field.

The Committee heard a report on the outcome of negotiations between Austria and Yugoslavia concerning the hydro-electric development of the River Drave, which flows through those two countries. It noted that progress had been made in reaching agreement on present and future rules for exploiting hydro-electric installations on the river. It is hoped that a compromise may be reached and that a protocol between the two countries can be signed in Geneva in October.

The session of the Electric Power Committee referred to was presided over by Mr. P. Smits (Belgium) and at the end Mr. Ake Rusck (President of the State Power Board, Sweden) was elected chairman. Mr. Stjepe. Han (Yugoslavia) and Mr. Visentini (Italy) were elected vice-chairmen.

ELECTRICITY SUPPLY

Grid Conditions Studied

Atomic Power Prospects

A SERIES of experiments has recently been carried out by the British Electricity Authority to enable the Authority's engineers to calculate more accurately the adjustment required to correct any deviation from the standard frequency. The first experiments were carried out by dividing the grid into two halves, northern and southern, the only link being the 132 kV line from Meaford, in Staffordshire, to Warrington. The switch on the Meaford end of this line was then tripped out under known conditions of power flow, and the effect on the system studied.

To check the information obtained from the preliminary experiments, the northern and southern halves of the country were again linked through the grid, and three times Hams Hall power station staged what was, in effect, a major breakdown. On each occasion 150 MW of the station's plant was taken out of commission instantaneously, and test equipment recorded the effect on the grid system.

Considerable technical problems had to be overcome by the station's staff, for the "breakdown" had to be organized to split-second timing. Although the experiments caused a momentary flicker in the frequency of the grid there was no effect at all on any consumer's supplies. B.E.A. engineers have described the tests, which have now been completed, as "a complete success."

South Wales Rural Electrification

When, two months ago, the South Wales Electricity Board announced details of its capital expenditure for 1953–54 it was made clear that the £310,000 available for the current stages (4 and 5) of the Board's rural development programme would meet only the minimum requirements. Now the Board announces that a further sum of £90,000 has been allowed for the purpose out of an additional total of some half a million pounds for the whole country. There will thus be £400,000 available this year for works which consist in the main of substantial schemes for constructing new high and low voltage networks in localities at present undeveloped. Apart from this, it is expected that £40,000 will be spent on the connection of consumers to existing networks in rural areas, £25,000 on supplies to rural housing estates, £85,000 on meters and services, and £350,000 on reinforcement of existing mains and construction of new mains in rural areas, making a total of £900,000.

Although much more will be spent this year than last year, the Board says it must be remembered that the electrification of rural South Wales is a vast project, and to ensure that a fair deal is given to the many competing claims of different rural localities the Board will discuss the priorities of specific projects with the Consultative Council as in the past. In view of the heavy expenditure proposed the Board appeals to consumers and prospective consumers in the rural areas to make full use of the electricity supply—at present 40 per cent of the farmers connected spend less than £10 a year on electricity.

Australian Atomic Energy Forecast

The Premier of South Australia, Mr. Playford, who has just returned from a tour in which he inspected atomic energy research stations in Britain and the United States, forecast in Adelaide on 21st July that the State's next power station, which would be needed by about 1960, would be operated by atomic energy. He added that it would follow the completion of two coal-burning stations now being constructed at Port Augusta. He was convinced that his forecast made eighteen months ago that the State would have industrial atomic power within ten years would prove conservative. He emphasized that the atomic power which would be available in 1960 would be cheaper in South Australia than power from present fuels. He considered that Great Britain was now seriously challenging America's superiority in the sphere of atomic energy for commercial and domestic purposes.

Connection of 750,000th Consumer

The total number of consumers of electricity in the area of the South West Scotland Electricity Board reached 750,000 on 17th July. Officials of the Board marked the occasion by a ceremony at Hamilton at which the Provost, Mrs. Mary S. Ewart, formally connected the latest consumer by closing the main switch at the home of Mr. and Mrs. C. Sneddon. The

house is one of those recently completed in a new housing scheme where all in-going tenants are allowed to state their choice of fuel for cooking. Mrs. Sneddon has chosen an electric cooker. Of the 750,000 consumers now receiving a supply, 116,574 have been connected since the industry was nationalized, representing a capital expenditure of £11 million.

Mr. J. S. Pickles, chairman of the Board, recalled that the first public electricity supply in South West Scotland was given in 1880 to the G.P.O. in George Square, Glasgow. This was the first post office in Great Britain to be lit by electricity. In Hamilton, a lighting order was granted in 1898 and a supply was given by Edmundsons in 1902, the undertaking being acquired by the Town Council in 1926.

Mrs. Ewart said she hoped to see the day when the housewife would have all the electrical appliances she required at very low cost.

Supply Reinforcement and Extension

The South West Scotland Electricity Board has approved schemes for the reinforcement of supply at Greenock at a cost of £267,000, Dumfries at £242,000, Beith at £13,864 and the Netherlee, Stamperland, Clarkston area of Glasgow at £8,648. In addition, the Board has approved schemes for providing supplies to 3,310 new houses at Drumchapel, Glasgow, at £138,073 and 300 new houses at Simshill, Cathcart, at £27,334.

Number of Employees

At a meeting of the North Eastern Electricity Consultative Council at Newcastle-on-Tyne a motion was submitted by the Tees Local Committee calling for the setting up of an *ad hoc* committee to make periodical inquiries into the number of people employed by the Board. Mr. W. S. Hall, chairman of the Council, said that in reply to an inquiry about staff Mr. H. H. Mullens, chairman of the Electricity Board, had pointed out that an establishment committee dealt with this question and performed its work adequately. Alderman M. Bloom, of West Hartlepool, supporting the Tees plan, said they should make certain that men taken on as a temporary measure were not eventually absorbed "into the ever-growing brotherhood of workers for the Board." The Council had a duty to the public. On the motion of Alderman H. Storey, of Scarborough, it was decided to ask the Electricity Board to allow members of the Council to have observers present at meetings of establishment committees both at headquarters and in Sub-Areas.

Transmission Line

Surrey Town and Country Planning Committee has decided, subject to the observations of the Air Ministry, to raise no objection in principle to a proposal by the British Electricity Authority to construct a transmission line—part of the supergrid—through N.W. Surrey to West Weybridge. Further consideration is to be given to the section of the line through Chertsey, however, the U.D.C. having in mind an alternative route through the district. It was stated that the line, from Iver, Bucks, would enter Surrey over Old Dean Common and pass through the districts of Frimley and Camberley, Bagshot, and Chertsey. Towers 136ft high with a cross-arm spread of 45ft would be used, spaced at 1,200ft. Extension of the line across the Thames would be the subject of another application.

Preference for Electricity

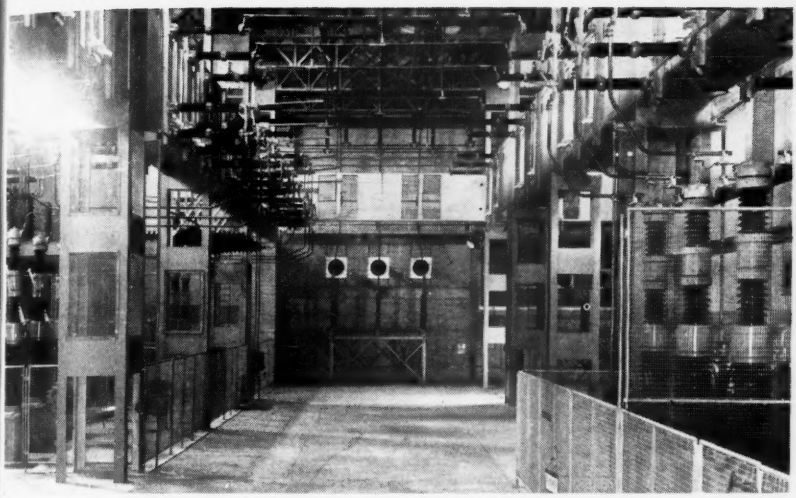
Speaking at a meeting of the Ennerdale R.D.C. Councillor J. Noctor, chairman of the Housing Committee, said that supplying both gas and electricity to new housing estates now being developed would mean extra rents. The majority of prospective tenants would prefer electricity and the Council would see that they got it.

Carmarthen Bay Switchgear

WE have received from Ferguson Pailin, Ltd., information relating to the first portion of the 132 kV 2,500 MVA switchgear which is associated with the new Carmarthen Bay power station and which was recently commissioned. This indoor installation is believed to be of a type not previously used in this country and the main equipments are as follows: two generator transformer circuit breakers, two station transformer breakers, six feeder units, one busbar section circuit breaker and one busbar coupler.

The main switchgear is housed in a large "hall," which is centrally divided by a wall and various plant rooms, into east and west half switch-houses. Air blast circuit breakers are employed and these are mounted in two rows on either side of the switch house. Generator, station transformer and bus coupler circuit breakers are located on the south side of the building and feeder circuit breakers on the north side. The busbars are suspended from roof trusses by solid core porcelain insulators, and the main busbar runs down the centre of each half switch house, while the reserve bar is arranged in a double U formation coupled by two isolators. Access to the busbars is permitted by trolleys suspended from rails running between the various phases.

The incoming lines are terminated on towers



East half switch-house at Carmarthen Bay power station

immediately outside the building and brought in by means of synthetic resin bonded paper condenser bushings passing through the walls. The circuit breakers are air blast operated and are a slightly modified version of the standard outdoor equipment, the only concession to the indoor principle being the support insulators for the fixed isolator contacts. Each circuit breaker comprises three single-phase units incorporating two interruptor heads per phase and arranged in series on one side of the breaker. Separate control units are provided on each phase, and to guard against failure of a trip coil all three phases are coupled together pneumatically.

Operating air for the circuit breakers is supplied to local receivers from duplicate banks of compressors. Initially there are two compressors per bank, but the final arrangement will comprise three per bank. Air is stored in the main storage receivers at 650 lb/sq in and is reduced to the operating pressure of 300 lb/sq in when passed to the individual circuit breaker receivers. The circuit breakers are controlled from the control room in the power station.

All the isolators are of the single-break type, the moving-contact half being arranged to operate in a vertical plane. The three phases are mechanically coupled and they are operated from ground level by means of a hand operating mechanism. The busbar isolators are mounted vertically on the main steelwork inside the building, whilst feeder isolators are mounted horizontally on floor mounting structures. Access to the busbar isolators is permitted by a walk-way in the main steelwork, with hinged platforms which can be let down for maintenance purposes. These platforms are interlocked so that they can only be lowered when the particular busbar is earthed. When the busbar is alive the platform forms part of the screenwork on either side of the walk-way.

American Research Publications

THE Mutual Security Agency Mission to the United Kingdom recently announced that $13,000 had been made available for the purchase of American technical and scientific publications needed by British research associations.

The sum was approved, under the M.S.A. Technical Assistance Programme to help increase productivity, to pay for lists of books and periodicals submitted by the Department of Scientific and Industrial Research covering the requirements of its headquarters and nine of its research stations as well as of thirteen research associations. In 1949 the Economic Co-operation Administration, the predecessor of the M.S.A., approved $22,500 for a similar project, of which over $17,000 was actually spent.

Among the beneficiaries are the British Electrical & Allied Industries' Research Association, the British Hydromechanics' Research Association, the British Scientific Instrument Research Association and the British Welding Research Association.

Financial Section

STOCKS and SHARES

ACTIVITY in the industrial markets of the Stock Exchange has lately been monopolized to a large extent by some of the leading electrical equipment stocks and shares. Dealers reported a huge turnover in the new English Electric debenture stock and a sustained interest, at rising prices, in the same company's new ordinary shares. G.E.C. shares were active under the influence of the annual report and the final dividend declaration. A.E.I. ordinary again went ahead in a fashion to suggest that the disturbance caused by the share issue has subsided. Reyrolle and C. A. Parsons ordinary were also favoured, and another 1s advance in Chloride Electrical put the shares 5s above the quotation ruling at the beginning of July.

G.E.C. Results

The General Electric Company's final dividend brings the total, for the year ended last March, to 11¼ per cent. In all, the latest annual distribution costs £716,000 net, against £628,000 previously. With the taxed group profit down from over £2 million to £1·3 million, the earnings-cover for the payment is reduced from 3 to about 1½ times. After hardening to 42s 6d earlier in the week, the price of the £1 ordinary shares came back subsequently to 40s sellers. The fall of £2 million in the consolidated trading profit is ascribed, in the report, to a steep fall in sales of consumer goods, and to a lower rate of gross profit.

Wireless and T.V. Relay

A market was started last week in the securities of British Relay Wireless and Television, Ltd. Formed a few months ago, this company acquired a group of wireless relay businesses, including those operated by the joint subsidiary of the Pye and Murphy Radio companies which is concerned largely with the development of a combined sound and television relay system. A statement, advertised as a preliminary to the official quotation of the securities, shows that profits of the group have been rising consistently over a period of ten years, the net figure for the latest period being close on £250,000 before tax.

Ordinary and Loan Stocks

Of the £475,000 issued ordinary capital of the new Relay Wireless and Television Company, the Pye and Murphy firms receive or subscribe 700,000 " B " 5s shares and subscribe 200,000 of the 1,200,000 " A " 5s shares. It is the latter for which an official quotation has been obtained, and in which dealings are now taking place around 12s. Regarding dividend possibilities, the prospectus forecast a 16 per cent distribution for the year ending next April, on the assumption that profits will be running at about last year's level. Dealings are in progress also in the £400,000 6½ per cent loan stock 1960/67 at a price around 102½.

English Electric New Stocks

Following the overwhelming success of the issue, the new English Electric 4½ per cent debenture 1972/77 developed a premium of 2⅞ points on the figure of 97½ at which the offer was made. The stock is the subject of a substantial demand, much of it apparently on account of original allottees anxious to make up their holdings to larger amounts. A material attraction is, of course, the fact that stock can for the present be bought free of transfer stamp, an advantage which saves the buyer an expense equivalent to about nine months' net interest. The premium on the company's new ordinary shares, which were offered at 48s 6d, advanced quickly from 3s to nearly 5s, and eased later to 4s 4½d.

Reliance-Clifton Preference

The Reliance-Clifton Cables and Industrial Products Company is issuing 39,250 new 5 per cent preference shares to ordinary shareholders by way of a bonus. Some of these have recently been available in the market at about 19s 3d, free at present from the usual 2 per cent transfer stamp on a purchase. The yield works out at 5·2 per cent. On the total amount of preference shares now in issue, dividend requirements will absorb little more than £4,000 net, whereas the surplus of earnings shown in the recently published accounts exceeded £150,000.

Miscellaneous Matters

British Electric Traction deferred stock is expected to be quoted on 5th August in its new form of 5s units. The formerly cumbrous quotation of £580 per £100 stock would become 29s per 5s unit. Telephone Properties £1 shares, one of the most spectacular performers in this year's markets, held the previous week's 10s jump, in anticipation of an early statement concerning the sale of the Venezuelan undertaking.

ELECTRICAL INVESTMENTS

Past Week's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price 27th July 1953	Week's Rise or Fall	Est. Yield p.c. £	s	d
Gilt-edged and Overseas Stocks							
Brit. Elec. 1968/73	3	3	87½	—	3	8	6
Brit. Elec. 1974/77	3	3	86½	—	3	9	4
Brit. Elec. 1976/79	3½	3½	92½	—	3	15	8
Brit. Elec. 1974/79	4½	4½	102	—	4	3	4
Calcutta Elec. ..	6†	6†	19/6	—	6	3	0†
East African Power	7	7	23/6	—	5	19	3
Nigerian Elec. ..	10	10	22/6	—	8	13	0
Palestine Elec. "A"	5†	Nil	12/-	+9d		Nil	
Perak Hydro-Elec.	Nil	Nil	15/-	—		Nil	
Equipment and Manufacturing							
AberdareCables(5/-)	20	25	16/-	—	7	16	4
Aerialite (1/-) ..	83½	88½	8/9	—	10	1	10
Allen, W. H. ..	15	15	45/9	—	6	11	3
Aron Elec. Ord. ..	15	20	45/-	—	8	17	10
Assoc. Elec. Ord. ..	20	20	76/3	—	5	5	0
Automatic Tel. & El.	15	15	56/3	—	5	6	8
Babcock & Wilcox	18	18	63/6	—	5	13	4
Baldwin, H. J. (2/-)	25	20	4/-	—	10	0	0
Bakelite (10/-) ..	—	12½	18/-	—	6	19	0
British Aluminium	12	12	38/-	—	6	6	3
B.I. Callender's ..	9	10	36/3	+3d	5	10	4
British Thermostat (5/-)	30	35	16/3	—		—	
British Vac. Cleaner (5/-)	25	25	11/6	—	10	17	6
Brook Motors (10/-)	20	20	32/6	—	6	3	1
Brush Ord. (5/-) ..	10	4	4/3	—		—	
A. F. Bulgin (1/-)	30	30	2/9	—	10	18	0
Burco (5/-) ..	38¾	35	18/3	—	9	13	0
Chloride El. Storage	15	20	76/-	+1/-	5	5	3
Cole, E. K. (5/-) ..	25	25*	18/3	+6d	6	17	0
Cossor, A. C. (5/-)	Nil	10	9/-	—	5	11	1
Crabtree (10/-) ..	17½	17½	29/-	+6d	6	0	8
Crompton Parkinson Ord. (5/-) ..	11½	11½	11/3	—	5	0	0
De La Rue (5/-) ..	35	Nil	7/9	—		—	
Decca (5/-)	112½	150	26/-	−6d	5	15	6*
Dewhurst (2/-) ..	22½	19*	5/6	—	6	18	3
Dictograph Tel.(2/-)	20	20	5/6	—		—	
E.M.I. (10/-) ..	12	12	13/6	—	8	17	10
Electrical Components (5/-) ..	20	20	10/-	—	10	0	0
Elec. Construction	15	15	52/6	—	5	14	3
Enfield Cable Ord.	7½	5	21/3	+9d	4	14	0
English Electric ..	15	15	52/6	+⅛	5	14	3
Ericsson Tel. (5/-)	22†	22*†	37/-	—	2	19	6†
Ever Ready (5/-)	35	35	25/6	—	6	17	9
Falk Stadelmann	15	15	42/9	—	7	0	2
G.E.C. Ord. ..	22½	11½*	40/-	−9d	5	12	6
General Cables (5/-)	30	30	16/3	—	9	4	8
Greenwood & Batley	15	17½	40/-	—	8	15	0
Hackbridge Cable (5/-)	20	20	11/6	—	8	13	10
Hackbridge Hewittic (5/-)	20	20	17/-	—	5	17	8
Hall Tel. Acc.(10/-)	10	10	10/-	—	10	0	0
Heatrae (2/-) ..	12½	12½	4/-	—	6	5	0
Henleys (10/-) ..	20	10½*	16/9	+3d	6	5	6
Holophane (5/-) ..	15	20*	12/6	—	8	0	0
Hoover (5/-) ..	35	25	22/3	+3d	5	12	3

Company	Dividend Previous	Dividend Last	Middle Price 27th July 1953	Week's Rise or Fall	Est. Yield p.c. £	s	d
Equipment and Manufacturing (continued)							
Intl. Combustion (5/-)	25	15*	13/9	—	5	9	0
Johnson & Phillips	15	15	51/-	+6d	5	17	8
Lancashire Dynamo	12½	12½*	41/3	—	6	1	0
Laurence, Scott(5/-)	15	15	12/3	—	6	2	6
London Elec. Wire	12½	15	57/6	+6d	5	4	2
J. Lucas	7½	9½	39/6	—	4	12	9
Marryat & S. (2/-)	22½	22½	5/9	—	7	16	6
Mather & Platt ..	12½	15	49/6	+6d	6	1	3
Metal Industries ..	15	12*	40/-	—	6	0	0
Mid. Elec. Mfg. ..	15	15	59/6	—	5	0	10
Murex	15	15	56/-	—	5	7	2
Newman Ind. (2/-)	10	10	2/3	—	8	17	9
Oldham & Son (1/-)	35	17½*	2/6	—	7	0	0
Parnall (Yate) (5/-)	6	6	3/-	+1½d	10	0	0
Parsons, C. A. ..	10*	12½	66/3	+⅜	3	15	6
Plessey (5/-) ..	22½	25	25/6	—	4	18	0
Pye Deferred (5/-)	18	18	17/9	—	5	1	6
Revo (10/-) ..	27½	27½	47/-	+6d	5	17	0
Reyrolle	10*	12½	58/9	+⅜	4	5	0
Scot. Cable (4/-) ..	32	20*	12/3	—	6	10	7
Siemens Ord. ..	10	10	32/6	—	6	3	0
Southern Areas ..	5	6	14/3	+1/-	8	8	6
Strand Elec.(5/-) ..	17½	17½	10/-	—	8	15	0
Sturtevant (5/-) ..	17½†	18·1*†	24/3	−3d	3	14	9
Switchgear & Cowans (5/-)	22½	22½	14/-	—	8	0	9
Taylor, T. (5/-) ..	20	25	20/-	—	6	5	0
T.C.C. (10/-) ..	20	20*	36/3	+⅛		—	
T.C. & M.	10	8½*	27/6	—	6	3	8
Telephone Mfg.(5/-)	10	10	7/6	—	6	13	4
Thorn. Elec. (5/-)	10	12½	10/6	—	5	19	0
Tube Investments	25	15*	57/6	+1/-	5	4	3
Vactric (5/-) ..	Nil	Nil	5/9	—		Nil	
Veritys (5/-) ..	7½	10	4/6	−3d	11	2	2
Walsall Conduits (4/-)	70	70*	44/6	—	6	5	10
Ward & Goldstone (5/-)	45	45*	36/3	—	6	4	4
Watford (2/-) ..	25	25	7/-	+9d	7	2	10
Westinghouse Brake	14	15	54/6	—	5	10	1
West, Allen (5/-) ..	15	15	11/3	—	6	13	4
Trusts, Transport and Communications							
Anglo-Am. Tel.: A Ord.	—	6	84½	+1	7	2	0
Ord.	—	3¾	57½	—	6	10	5
Anglo-Portuguese	8	8	21/6	—	7	8	10
Brit. Elec. Traction: Def. Ord. ..	25	35	580	—	6	0	8
Cable & Wireless: Ord.	8	8	135	—	5	18	6
4% Loan ..	4	4	96	—	4	3	4
Calcutta Trams ..	6†	6†	21/6	—	5	11	6†
Cape Elec. Trams	5	5½	12/-	—	9	3	4
Marconi Marine ..	10	10	28/-	—	7	2	10
Oriental Tel. Ord.	16	16	67/6	—		—	
Telephone Props.	8	8	5¾	+⅛		—	
Tele. Rentals (5/-)	10	10*	9/-	—	5	11	0

* After capital bonus. † Dividends are paid free of income tax.

The above quotations are based upon the middle prices given in the Stock Exchange Daily Official List.

REPORTS and DIVIDENDS

The General Electric Co., Ltd.—The report and accounts for the year ended 31st March last show that the aggregate profit of the group, before United Kingdom and overseas taxation and proportion attributable to minority shareholders, amounted to £4,230,234, as compared with £6,603,957 for the preceding year. United Kingdom taxation absorbs £2,503,657 (against £3,785,914), overseas taxation £398,288 (£669,152), and profit attributable to minority shareholders in subsidiary companies £62,235, leaving a consolidated net profit of £1,266,054 (£2,091,114). The net profit dealt with in the accounts of the holding company is £1,196,834, to which is added net income relating to previous years of £2,566,781, and a balance of £1,549,539 brought in, making £5,313,154. From this the following appropriations have been made :—Bonus issue expenses, £64,461; general reserve, £800,000; to reserve against future stock depreciation, £950,000; to reserve for increased cost of plant replacement, £500,000. It is proposed to pay a final dividend on the ordinary stock of 7½ per cent, making 11½ per cent on £11,755,440 ordinary stock (against 22½ per cent on £5,877,720 for the previous year). The balance carried forward is £2,102,271.

The report states that the reduction in profit was due to the steep fall in sales of consumer goods both at home and abroad, and to a lower rate of gross profit. Output of capital goods continued to rise, resulting in a record production for the year. Overseas companies have had a satisfactory year, though trading conditions have led to reduced profits. The order book for capital goods at the end of the financial year was satisfactory, but since then the outlook has tended to become less favourable on account of the shortage of finance the world over and the increased competition in all markets. Orders for consumer goods show slight signs of improvement and there are indications that the deterioration experienced during the last financial year has stopped.

Reliance-Clifton Cables & Industrial Products, Ltd.—In the course of his address at the annual meeting held on 17th July, Mr. H. Davis (chairman) said that favourable conditions continued through the earlier months of the present year. In April the price of copper was reduced by nearly 10 per cent and was followed by an announcement that the metal was to be freed from price control in August. This resulted in an immediate curtailment of demands for wire and cable to a minimum, and considerable competition for the available business. Whilst trading conditions gave no possibility of their reaching the exceptional profit level of last year, they should do no worse than in the preceding years.

The Electric Furnace Co., Ltd., proposes to make a scrip issue of one-for-one to ordinary holders. It is also proposed to make a scrip issue of three 7 per cent cumulative preference shares for every seven cumulative preferred ordinary shares held in return for the preferred ordinary holders surrendering their participating rights. The preferred ordinary will be converted into 7 per cent cumulative preference. A meeting to consider the resolutions will be held on 18th August.

Pirelli-General Cable Works, Ltd., reports that after providing £1,069,739 for taxation, the net profit for the year ended 31st March last is £810,043, as compared with £771,917 for the previous year. General reserve receives £400,000 and it is proposed to pay a dividend for the year of 8 per cent, and a bonus of 12 per cent (both unchanged). The balance carried forward is £1,039,338 (against £825,830 brought in).

Newman & Watson, Ltd.—The accounts for the year ended 31st March last show a group trading profit of £87,984, as compared with £105,479 for 1951-52, and after deducting depreciation and providing £39,535 for taxation, the net profit is £32,132 (against £39,696). It is proposed to pay an ordinary dividend of 15 per cent (against 12½ per cent), less tax, plus a capital distribution of 2½ per cent not subject to tax.

Davey, Paxman & Co., Ltd., report a trading profit for the year ended 31st March last of £658,941, as compared with £356,187 for the previous year, and after meeting taxation of £348,030, there is a net profit of £313,250 (against £140,463). General reserve receives £240,000, and employees receive a Coronation bonus of £14,000. The proposed ordinary dividend for the year is 15 per cent (against 10 per cent), and £59,309 is carried forward (against £51,640 brought in).

The Nigerian Electricity Supply Corporation, Ltd., in its report for the year ended 28th February last, shows a net profit of £143,304, as compared with £120,100 for the previous year. After providing £81,228 for taxation and placing £20,000 to replacement reserve, it is proposed to pay a final dividend of 4 per cent and a bonus of 2 per cent, making 10 per cent for the year (unchanged).

Mather & Platt, Ltd., have declared an interim dividend of 4 per cent (unchanged).

The Globe Telegraph & Trust Co., Ltd., announces the payment of a final dividend for the year ended 30th June last of 5 per cent, making 8 per cent for the year (same).

New Companies

Fenners (Surrey), Ltd.—Registered 9th July. Capital £1,000. To acquire the business of a manufacturer carried on by Gerald Fenner Burgoyne at Woking, and to carry on the business of manufacturers and dealers in mechanical and electrical machines and devices of all kinds, wireless, television and electronic apparatus, etc. G. F. Burgoyne is the first director. Secretary : J. H. Huber. Regd. office : Profile Works, 90b, Church Street, Woking, Surrey.

Plessey (Northern Ireland), Ltd.—Registered 9th July. Capital £10,000. Electricians, electrical and electronic engineers, manufacturers of electrical machinery and electrical and electronic apparatus, equipment, components and accessories, etc. Directors : E. H. Ousten and M. T. Slater. Secretary : M. T. Slater. Solicitors : W. F. Cross, 54, Vicarage Lane, Ilford.

T. V. Conversions & Services, Ltd.—Registered 9th July. Capital £1,000. Television and radio engineers, etc. Directors : L. E. W. King (permanent managing director), A. W. A. Hall and A. D. Booth. Secretary : H. L. King. Regd. office : 6, Tudor Parade, London Road, Hounslow, Middx.

R.H. Television Development Co., Ltd.—Registered 11th July. Capital £5,000. Electrical and radio engineers, etc. Directors : R. F. Hawkins and Mrs. Norah E. Hawkins. Regd. office : 4, London Road, Bromley, Kent.

Electric Audio Reproducers, Ltd.—Registered 13th July. Capital £5,000. Manufacturers of and dealers in and hirers of electrical and electronic sound reproducing and recording equipment, gramophones, radio and television receivers and components, etc. The first directors are to be appointed by the subscribers. Regd. office : 1, Hanover Square, W.1.

S. H. Simon (Electrical), Ltd.—Registered 20th July. Capital £500. Electrical, mechanical, marine, constructional, internal combustion and general engineers, etc. S. H. Simon is the first director. Regd. office : 29, Wyndale Avenue, N.W.9.

Electrotechnics (Tottenham), Ltd.—Registered 17th July. Capital £100. Manufacturers and repairers of and dealers in electrical equipment, apparatus, etc. Directors : A. A. Towells, R. S. Hawes and Lucy W. Towells. Regd. office : 4, Broadway Chambers, St. Peter's Street, St. Albans,

Liquidations

Silver-Tone Lighting & Radio, Ltd., electrical retailers.—Winding up voluntarily. Liquidator, Mr. B. Silvertone, 3a, Amhurst Parade, Stamford Hill, London, N.16, appointed 8th July.

Alstans Electrical, Ltd.—Meetings 25th August at 126, Colmore Row, Birmingham, 3, to receive an account of the winding-up by the liquidator, Mr. R. F. Bendall.

Chas. Jeremy (Electric), Ltd.—Winding up voluntarily. Liquidator, Mr. L. R. Binns, Copthall House, Copthall Avenue, London, E.C.2, appointed 16th July.

Bankruptcies

W. R. Kerr, lately carrying on business at The Green, Whittington, near Lichfield, Staffs, electrical engineer.—Receiving order made 15th July on debtor's own petition. First meeting held 29th July. Public examination 25th August at the Court House, Lichfield Street, Walsall.

R. J. Camden, carrying on business at 32, New Bridge Street, Exeter, electrical engineer.—First meeting held 28th July. Public examination 14th September at The Castle, Exeter.

M. J. Ruddick, 89, Park Road, Wigan, Lancs, electrical appliance dealer.—First and final dividend of 2¾d in the £, payable on and after 7th August at the Official Receiver's office, West Africa House, 25, Water Street, Liverpool.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 22nd August:—

ALUFLEX. No. 708,377, Class 9. Electric flexible conductors made of an aluminium alloy.—Trefileries et Laminoirs du Havre, Paris, France. Address for service, c/o Marks & Clerk, 57 and 58, Lincoln's Inn Fields, London, W.C.2.

No. 712,981(design), Class 9. Electric flat irons.—Hermes Products (Export), Ltd., Munster Park Works, Gowan Avenue, Fulham, London, S.W.6.

VENTICAL. No. 714,595, Class 9. Electrical apparatus and instruments; wireless sets (sold complete); and parts included in Class 9.—Volex Electrical Products, Ltd., 37, Brown Street, Manchester, 2.

ATOM. No. 715,258, Class 9. Electric batteries.—Atomic Battery Co., Ltd., Salisbury, S. Rhodesia. Address for service, c/o Wildbore & Gibbons, 101, Leadenhall Street, London, E.C.3.

BLENDMASTER. No. B716,144, Class 9. Thermostatically controlled valves for mixing cold water with hot water or steam.—Thermostatic Mixing Valve Co., Ltd., 43, Cannon Street, Birmingham, 2.

WELMEG. No. 716,931, Class 9. Electrical apparatus and instruments and parts.—Welwyn Electrical Laboratories, Ltd., Trading Estate, Bedlington Station, Northumberland.

DEAFONE. No. B717,214, Class 9. Telephone amplifiers and parts and fittings.—Televox (London), Ltd., 5, Bourne Street, Sloane Square, London, S.W.1.

POLYCOTE. No. B717,252, Class 9. Aerials for wireless telephony, telegraphy and television; electric flexibles, wires and cables for electric transmission systems, and electricity conductors.—Concordia Electric Wire & Cable Co., Ltd., Trent Mills, Derwent Street, Long Eaton, near Nottingham.

NEUTRULITE. No. 713,308, Class 11. Electric light fittings.—J. B. Haughton and J. H. Edwards, trading in co-partnership at Cheswick Grove, Marton, Blackpool.

EMPLOYMENT IN 1952

Ministry of Labour Report

THE general review of the labour situation in 1952, contained in the annual report of the Ministry of Labour and National Service (H.M. Stationery Office, 5s net), contains a good deal of information of electrical interest.

Although there was no change in the level of employment in the metals, engineering and vehicles group as a whole, employment fell in a number of sections, including miscellaneous electrical goods. This was offset by increases in most of the sections concerned with heavy capital equipment and defence work. The engineering industries and vehicle manufacture together accounted for nearly one half of the aggregate hours of overtime worked.

In engineering, although there was unemployment in some places due to shortage of raw materials, re-tooling, or export difficulties, in general there was an unsatisfied demand for skilled labour. The shortage of draughtsmen, already a cause for concern in 1951, was intensified in 1952.

The total labour force in the gas, electricity and water supply services was 372,000 at the beginning of 1952 and remained generally steady throughout the year, showing a slight increase to 375,000 at the end of the year. Demands for boiler fitters and welders for power stations caused some concern during the first half of the year, but in June there was an improvement in the position, and progress was made during the remainder of the year in meeting the demands for engineering and maintenance staffs at the power stations. Between 12,000 and 14,000 building workers were engaged during the year on the construction and extension of power stations. The number of workers on contracts for the Scottish Hydro-Electric Board also increased and at the end of the year totalled 3,837, as compared with 3,641 at the end of 1951.

On the manufacturing side the engineering, electrical goods and vehicles group showed an increase in the number of males employed from 2,231,000 at the end of 1951 to 2,269,000 at the end of 1952, but female labour fell from 569,000 to 550,000.

Employment in the electrical wiring and contracting industry remained at a high level throughout the year, although a little below that of the previous year. The demand for workers in this industry decreased slightly, but the number unemployed averaged less than 2 per cent of the total labour force.

The Technical Personnel Committee of the Technical and Scientific Register kept under review during the year the demand for scientists and engineers. The most urgent problem was the shortage of scientific and engineering manpower in the field of radio, radar and electronics. A sub-committee set up to deal with this difficulty came to the conclusion that at the level of the professional engineer and scientist there was no short cut to the solution of the problem. The most practical way of improving the situation seemed to be the provision of post-graduate training in specialized branches where the shortages were particularly acute. As a first step, the sub-committee recommended the establishment at the Imperial College of Science and Technology of a one-year course of training in electronic valve engineering for selected graduates from the universities and from industry. It was hoped to start a course in the autumn of 1953. At the technician level the problem seemed less intractable; it was a question of attracting more recruits to the industry and training them up to the required standards. A scheme of training agreed between the Ministry and the Radio Industry Council was arranged under which trainees would receive training in workshops, test departments and laboratories for a period of from four to five years with part-time day release from industry for technical education.

British Standards Yearbook

THE 1953 edition of the British Standards Yearbook has just been published at 12s 6d. It gives a list of the 2,000 British Standards current at the end of March last, with a brief description of the subject matter of each; a comprehensive index simplifies reference. The Yearbook gives the usual information on the membership of the General Council, the Divisional Councils and the Industry Standards Committees, together with the names of the representatives on the main Special Committees and Advisory Committees.

For the first time a list is included of the British Standards under which the Institution's certification trade marks are used, while particulars of the work in hand of all the Industry Standards Committees are also given. This publication is of great value to all those engaged in industry and commerce in enabling them to keep up to date with the increasing momentum of practical standardization and simplification.

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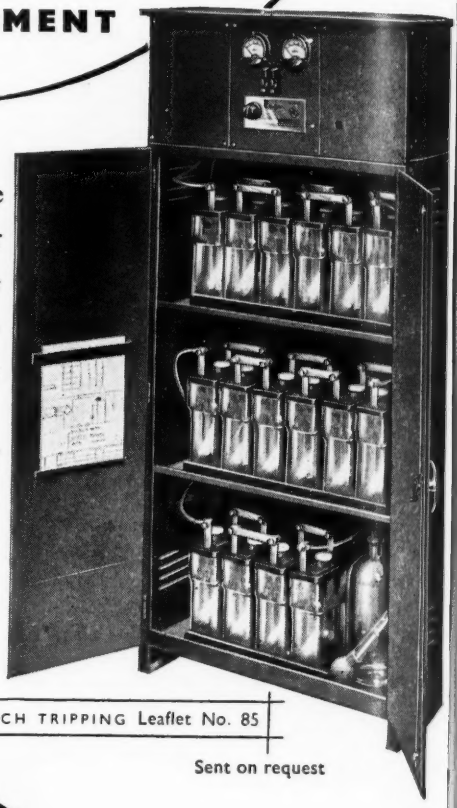

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NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 9th September from the Patent Office, 25, Southampton Buildings, London, W.C.2

1946

17969. British Thomson-Houston Co., Ltd.—Electron discharge apparatus of the velocity modulation type. 14th June, 1946. (696810.)

1949

13071. Electric & Musical Industries, Ltd.—Electric circuit arrangements embodying electron discharge valves. 17th May, 1950. (696811.)

28827. Nyrop, J. E.—Electrical method of bringing about physical or chemical alterations in liquids. 10th November, 1949. (696813.)

30986. Automatic Telephone & Electric Co., Ltd.—Telephone systems including loudspeaking equipment. 22nd November, 1950. (696885.)

1950

12077. Metropolitan-Vickers Electrical Co., Ltd.—Control means in alternating current servo-motor systems. 9th April, 1951. (696895.)

12626. British Thomson-Houston Co., Ltd., and Newman, D. J.—Crystal valves. 26th June, 1951. (696896.)

13052. Parsons & Co., Ltd., C. A.—Windings for rotors. 19th March, 1951. (696760.)

14407. Ashley Accessories, Ltd.—Snap-action electric switches. 11th June, 1951. (696816.)

16877. Robson, S., and Buckingham, J.—Waveguides and aerials. 6th July, 1951. (696900.)

16973. Planer, F. E.—Arrangement for the measurement and recording of electrical impedance and insulation resistance. 8th October, 1951. (696901.)

18587. English Electric Co., Ltd.—Electric motor control systems. 24th October, 1951. (696681.)

19352. Nalder Bros. & Thompson, Ltd., and Lipman, C. L.—Electrical measuring instruments and/or relays. 1st November, 1951. (696821.)

19547. Siemens Bros. & Co., Ltd.—Telephone systems. 3rd August, 1951. (696953.)

19607. British Electric Lamps, Ltd., and Dixon, V. G. R.—Electric lampholders. 24th October, 1951. (696766.) 19608.—Switch bases for electric lampholders. 24th October, 1951. (696767.)

20529. British Thomson-Houston Co., Ltd.—Crystal valves. 3rd August, 1951. (696904.)

21276. Ferranti, Ltd.—Electronic trigger circuits. 26th October, 1951. (696824.)

23051. Electric & Musical Industries, Ltd.—Negative feedback amplifiers. 6th September, 1951. (696827.)

23133. Ward & Goldstone, Ltd., and Couyoumdjian, A. O.—Flasher apparatus embodied in lampholder adaptors. 7th September, 1951. (696906.)

30007. Laurence, Scott & Electromotors, Ltd., Schwarz, B., and Schwarz, K. K.—Arrangements for the speed, torque and voltage control of dynamo-electric machines with pilot motor operated control system. 7th December, 1951. (696693.)

30486. Marconi's Wireless Telegraph Co., Ltd.—Radar reflector systems for use on buoys and other floating structures. 23rd October, 1951. (696834.)

1951

1743. Pye & Co., Ltd., W. G.—Apparatus and method for accurate measuring of d.c. voltage and resistance values by comparison. 16th January, 1952. (696837.)

1837. British Thomson-Houston Co., Ltd.—Motor-speed control systems employing magnetic amplifiers. 24th January, 1951. (696838.)

2655. Standard Telephones & Cables, Ltd.—Signalling arrangements for multi-channel carrier communication systems. 1st February, 1952. (696913.)

3369. British Thomson-Houston Co., Ltd.—Holders for electric lamps. 31st December, 1951. (696914.)

3392. Hofer, H.—Portable electric baking apparatus. 12th February, 1951. (696915.)

3638. Wood & Co., Ltd., H.—Safety device for use with electrically driven conveyors. 7th February, 1952. (696916.)

4329. General Electric Co., Ltd., Chubb, A. A., and Scowcroft, J.—Gas-discharge tube circuits. 18th January, 1952. (696842.)

5536. Hotpoint Electric Appliance Co., Ltd.—Electrically heated liquid receptacles. 20th February, 1952. (696701.)

6359. Glass Developments, Ltd., and Sproule, D. O.—Methods of testing materials for flaws and apparatus therefore utilizing ultrasonic waves. 7th March, 1952. (696920.)

6707. El-Re-Ma. Soc. Anon.—Process for the operation of switches, and a magnetic multiple switch aggregate for carrying out this process. 20th March, 1951. (696704.)

7467. Siemens Electric Lamps & Supplies, Ltd.—High-temperature electric lamps. 21st March, 1952. (696846.)

8113. Roberts, H. A.—Electric convector heaters. 27th March, 1952. (696708.)

8340. Charles, G. R. S.—Electrical condensers. 9th April, 1952. (696922.)

8471. British Broadcasting Corporation.—Electron discharge valve amplifiers. 31st March, 1952. (696848.)

12920. General Electric Co., Ltd., Brandreth, R. D., and Runciman, R. D.—Devices for controlling the position of a movable element. 20th May, 1952. (696853.)

13280. Perdijon, E.—Multiple circuit electrical switching device employing perforated cards. 5th June, 1951. (696786.)

14155. General Electric Co., Ltd., Brandreth, R. D., and Wilson, E.—Electrical apparatus of the kind including a chassis mounted inside a cabinet. 16th June, 1952. (696856.)

15833. General Electric Co., Ltd., and Cornell, W.—Means for connecting electrical conductors to busbars. 22nd May, 1952. (696717.)

16232. British Thomson-Houston Co., Ltd.—Excitations and control systems for electronic devices. 9th July, 1951. (696718.)

18282. Saba Schwarzwälder Apparate-Bau-Anstalt A. Schwer Söhne Ges.—Multiple-way inverse feed-back circuits. 2nd August, 1951. (696928.)

20416. Metropolitan-Vickers Electrical Co., Ltd.—Gas-blast electric circuit breakers. 29th August, 1951. (696726.)

21155. Westinghouse Electric International Co.—Control circuits for welding apparatus. 7th September, 1951. (696794.)

21890. Frantellizzi, B.—Clockwork device for controlling an electric circuit at predetermined hours. 18th September, 1951. (696931.)

23231. Shepherd, G. R. (Westinghouse Electric International Co.).—Multiple glass-to-metal seals for electron discharge devices. 5th October, 1951. (696987.)

25616. Philips Electrical Industries, Ltd.—Devices to determine the energy emitted by an X-ray tube per unit time in the form of X-rays. 1st November, 1951. (696934.)

25674. Philips Electrical Industries, Ltd.—Automatic signalling systems. 2nd November, 1951. (696988.)

28104. La Fauci, P., Marucci, T., and Dell'Orto, T.—Electric device for the random formation of a large number of combinations of forecasts regarding sporting events. 30th November, 1951. (696737.)

28147. Standard Telephones & Cables, Ltd.—Electron discharge apparatus. 30th November, 1951. (696991.)

28787. Beauvais, P. de.—Electric plug contact pins. 7th December, 1951. (696738.)

30303. Standard Telephones & Cables, Ltd.—Thermionic vacuum tube amplifier. 28th December, 1951. (696801.)

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883. Allmanna Svenska Elektriska Aktiebolaget.—Low-frequency two-phase alternating current commutator machine. 11th January, 1952. (696936.)

1875. Philips Electrical Industries, Ltd.—Piezo-electric devices. 23rd January, 1952. (696741.)

3561. Saba Schwarzwälder Apparate-Bau-Anstalt A. Schwer Söhne Ges.—Continuously variable condenser. 11th February, 1952. (696870.)

4754. Bureau Technique Gautrat.—Electric cells, for example for storage batteries. 22nd February, 1952. (696805.)

4759. Metropolitan-Vickers Electrical Co., Ltd.—Apparatus supplying current to electric arcs. 22nd February, 1952. (696743.)

4968. Communications Patents, Ltd.—Wired broadcasting systems and apparatus. 26th February, 1952. (696745.)

5375. Philips Electrical Industries, Ltd.—X-ray apparatus. 29th February, 1952. (696939.)

6653. Ateliers de Constructions Electriques de Charleroi.—Greinacher voltage doublers. 14th March, 1952. (696746.)

9710. Felten & Guilleaume Carlswerk Akt.-Ges.—Electrical high-tension pressure cable installation. 17th April, 1952. (696748.)

14222. Sperry Corporation.—Control system of the electric retroactive type. 5th June, 1952. (696750.)

STREET LIGHTING NOTES

THE Ministry of Transport has decided to recommend that consent be given to the borrowing by OLDBURY Town Council of £20,000 to meet the cost of improving the lighting of certain omnibus routes in the borough. The Council has resolved to use the B.T.H. type of lantern for future street lighting points on estate roads and conversions from gas to electricity and to accept the quotation of the company for the installation of 30 new lighting points in Brennand Road, Quinton, at a cost of £652.

Further efforts are being made to call a conference of London local authorities to press for uniform street lighting in the Greater London area. EALING Road Safety Committee, which has been one of those urging the need for such a conference, has pointed out that its intention is to secure uniformity of intensity and not standardization of types of equipment.

For converting the street lighting from gas to electricity, Ediswan STB/1 horizontal 45/60 W sodium street lanterns are now being installed throughout the town of CARNOUSTIE. Swan-neck brackets of varying lengths are mounted on existing gas columns to provide the requisite mounting height. The work is being carried out by the Edison Swan Electric Co., Ltd., the electrical sub-contractors being Sturrock & Brummage.

LIVERPOOL City Lighting Department proposes to install cold cathode lanterns on specially designed concrete standards at the Pier Head and George's Dock Gates. It will be the first installation of its kind in the country.

SOLIHULL Urban District Council has been recommended to instruct its surveyor (Mr. C. R. Hutchinson) to consider the installation of a new type of fluorescent street lighting.

SOUTH SHIELDS Town Council is to spend £3,777 on street lighting improvement schemes for Chichester Road, Imeary Street, Newcastle Road, Westoe Road and the Market Place.

BENTLEY (Yorks) U.D.C. is to proceed as soon as possible with a scheme for installing sodium lighting along a two-mile stretch of the Great North Road between Doncaster and Highfields.

Extension of WARWICK'S new street lighting scheme from St. John's in the town centre to Fisher's Brook on the Stratford Road has been approved by the Ministry of Transport.

TYNEMOUTH Town Council is to spend £2,560 on the conversion of lighting from gas to electricity in Wallsend Road, and £426 on improving the lighting in Queen Alexandra Road.

CHESTERFIELD Corporation has received the Ministry of Housing & Local Government's consent to the borrowing of £1,880 for street lighting on the Hady Lane estate and in Hady Lane.

It was stated at a BRIDGWATER R.D.C. press conference that after protracted negotiations street lighting for North Petherton and Wembdon might be installed in time for next winter. As soon as loan sanction is received orders will be placed for the necessary work.

DARLINGTON Town Council has received £1,150 loan sanction for 25 street lamps on the Springfield housing estate, and has applied for permission to borrow £4,550 for improved lighting in North Road.

BARROW-IN-FURNESS Corporation Highways Committee has approved a scheme utilizing 50 sodium lamps for street lighting on the Abbotsmead estate, the estimated cost being £3,000.

A special public meeting held at ASTON-ON-TRENT, Derbyshire, has decided to change the street lighting from gas to electricity.

WAKEFIELD Corporation General Works Committee recommends that the city engineer should be authorized to obtain tenders for the lighting of the streets in Area No. 2 of the Kettlethorpe housing estate.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia. — BRISBANE. — 30th September. State Electricity Commission of Queensland. One 350 kW gas engine driven generating set for Longreach Shire Council. (C.R.E. 24295/53. Ten/6792.)*

Ballymena.—3rd August. Rev. Mother Superior, Convent of St. Louis. Electrical installation at new secondary school. Plans, etc., from P. B. Gregory, chartered architect, 25, Gresham Street, Belfast.

Belfast.—6th August. Electric lighting installation at new art room block and addition to electrical installation at existing Linfield Intermediate School, Blythe Street. Education Architect's Department, Academy Street.

5th August. Electrical installation at new fire station, Lisburn Road. City Surveyor's Department, Architectural Section (Room 85), City Hall.

East Riding.—11th August. County Council. Supply and fixing of electrically operated flasher units and illuminated beacon globes at pedestrian crossings. County surveyor, County Hall, Beverley.

India. — BOMBAY. — 21st September. Electric Grid Office, Government of Bombay. Supply of two 3,000 kVA power transformers for the South Sujarat electric grid scheme. (C.R.E. 24275/53. Ten/6793.)*

Lanark.—County Council. Street lighting equipment. (See this issue.)

Mid-Worcestershire. — 29th August. Hospital Management Committee. Maintenance of refrigerators at fifteen hospitals. Group secretary, Hospital Management Committee, Birmingham Road, Bromsgrove.

Southern Rhodesia. — SALISBURY. — 7th August. Department of Posts and Telegraphs. Supply of 350,000 insulators. (C.R.E. 2396/53. Ten/6787.)*

Stafford.—10th August. County Council. Electric goods lifts in the hospital block at Fernleigh Hostel, Marston Road. T. H. Evans, clerk, County Buildings.

Uruguay. — MONTEVIDEO. — 2nd September. Administracion General de los Usinas Electricas y los Telefonos del Estado. Supply of 500 suspension units for street lighting. (C.R.E. 23630/53. Ten/6777.)*

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

ORDERS PLACED

Barrow-in-Furness. — Corporation. Accepted. Electrical installation work at the Central College of Further Education (£4,793).—T. Clarke & Co., Ltd.

Darlington. — Corporation. Recommended. Electrical installation work for 84 houses at the Firth Moor site (£1,960).—W. L. Clark.

Leeds.—Corporation. Recommended. Passenger lift at the Town Hall (£2,042).—Waygood-Otis, Ltd.

Nelson.—Corporation. Electrical installation work at 48 houses, Marsden Park housing estate (£1,153).—J. Young.

Sutton Coldfield. — Highways Committee. Street lighting in Chester Road (£3,095).—British Thomson-Houston Co., Ltd.

Swindon. — Corporation. Recommended. Electrical installation work at the Commonweal Secondary Grammar School (£2,988).—Southern Electricity Board.

Torquay.—Corporation Housing Committee. Accepted. Electrical work for a further 149 houses, Sherwell Valley estate (£3,520).—C. M. F. Allwood.

Wisbech. — Corporation. Recommended. Wiring Elm Road and New Drove housing estates (£1,885).—Grensells, Ltd.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Acton.—Houses (81), on five sites; borough engineer, Town Hall, W.3.

Ashton-in-Makerfield.—Shops with flats above at Landgate estate; U.D.C. surveyor.

Aycliffe (Co. Durham).—Houses (297) for Aycliffe Development Corporation; G. A. Goldstraw, chief architect.

Barking.—Houses, etc. (113), on the Thames View housing estate; borough engineer.

Basingstoke.—Nine shops and maisonnettes, with stores and garages, South Ham; borough architect, Municipal Buildings.

Bexley.—Reference library and administration centre; borough engineer.

Birmingham. — Extensions at Bordesley Street for Typhoo Tea, Ltd.; H. W. Weedon & Partners, architects, 45/47, Calthorpe Road, Edgbaston, Birmingham.

Bishop's Stortford.—Houses (50), London Road area; G. N. Drinkwater, clerk, Council House.

Blackburn. — Large extensions (£40,000—£50,000) at St. Mary's R.C. College; Dr. A. Cusack.

Bristol. — Dwellings (40), Wick Crescent; city architect.

Factory, Barton Vale; Tuckers Bros., Ltd., Oxford Street.

Cardiff.—Garage and service station, Newport Road; James Howell & Co., Ltd., St. Mary Street.

Houses (54), on sites at Pentyrch; R.D.C. surveyor, Park Place, Cardiff.

Chingford. — Houses (74), Tower estate, Epping; borough surveyor, Town Hall, E.4.

Corby.—First phase of proposed new fire station; county architect, County Hall, Northampton.

Darlington.—Houses (32), Firth Moor estate; borough architect.

Dewsbury.—Dwellings (230), Syke Lane and Church lane; borough engineer.

Edmonton.—Factory, Claverings Industrial Estate; Symex General Products, Ltd., 117a, Fore Street, N.9.

Farnworth.—Flats (45), Albert Road and Norris Street; borough surveyor.

Folkestone.—Houses (166), Hill Road area; borough surveyor, Municipal Offices, West Terrace.

Gosforth.—Houses (74), Regent Farm estate, for U.D.C.; Cussins, Ltd., contractors, The Drive, Gosforth, Northumberland.

Great Yarmouth.—Central public library; borough surveyor, 15, Regent Street.

Hatfield.—Houses (128), Roe Hill; J. H. Parker, architect to R.D.C., 82, Great North Road.

Huyton-with-Roby.—Houses (73), Mosscroft Farm estate; U.D.C. surveyor.

Jarrow-on-Tyne.—Sixty maisonnettes and 16 shops, Ormonde Street; borough engineer.

Leeds.—Flats (88), Seacroft and Swinnow estate; city architect.

London.—CHISWICK.—Additions to girls' county grammar school (£63,970); Middlesex county architect.

DEPTFORD.—Flats (40), Clyde Street; borough engineer.

LAMBETH.—Dwellings (201), Patmore estate; Wilson Lovatt & Sons, Ltd., 16, Grosvenor Crescent, S.W.1.

WESTMINSTER.—Factory, Hide Place; Sims & Russell, Ltd., 7/9, Bloomburg Street, S.W.1.

Manchester.—Erection of new showrooms at Deansgate for British & Colonial Furniture Co., Ltd.; J. Gerrard & Sons, Ltd., Swinton, Manchester.

Middlesbrough.—Houses (20), Acklam Road, for J. C. Pykett; T. A. Crawford, architect, Borough Road.

Monmouth.—Houses and maisonnettes, Rockfield Road and Mansion Lane; C. F. Ward, council architect, 158, Commercial Street.

North Riding.—Infants' school at South Bank; Cameron & Middleton, architects, Bedford Square, London, W.C.1.

Junior school at Eastfield, Scarborough; S. W. Milburn & Partners, architects, 9, Esplanade, Sunderland.

Infants' school at Marske; J. H. Napper, architect, 56, Eldon Place, Newcastle-on-Tyne.

Oswestry.—Extensions to market (£18,000); borough surveyor.

Ramsbottom.—Houses, Tagg Wood estate (104) and Pin Meadow estate (29); F. Bellis, clerk to U.D.C., Market Place.

Salisbury.—Divisional police headquarters; F. I. Bowden, county architect, County Hall, Trowbridge.

Solihull.—Development of shopping, business and civic centre, including cinema, in Hob's Moat Road; W. Maurice Mell, clerk to U.D.C., Council House.

Southend-on-Sea. — Radiotherapy department at General Hospital; L. J. Selby, architect, 79, High Street.

Stage 3 of new secondary school, Belfairs; and 84 houses, etc., on No. 17 housing site; borough architect, Alexandra Street Offices.

South Shields.—New clothing factory; S. Newman, Ltd., clothing manufacturers, Cone Street.

Stafford.—Methodist church; E. B. Norris, architect, 134, Newport Road.

Stourbridge. — Houses (39), Broadway; Wassell Bros., Bott Lane, Lye, Stourbridge.

Stourport.—Houses (72), Walshes estate, for U.D.C.; Percy Cox, Ltd., Quarry Bank, Brierley Hill.

Surbiton.—Branch bakery, offices and garage, Davis Road and Cox Lane; J. Lyons & Co., Ltd., Cadby Hall, W.14.

Factory, Cox Lane; Wayne Kerr Engineering Co., Ltd., Tolworth Close.

Thornton Heath.—Factory extension; R. Crawford & Co., Ltd., Bert Road, Bensham Lane.

Tipton.—Houses and flats (76), Dudley Port; borough engineer, Municipal Buildings, Sedgley Road West, Tipton, Staffs.

Torpoint.—Houses (44), Queen's Park estate; E. W. Penn, clerk to U.D.C., York Road Offices.

Twickenham.—Public library at Percy Road corner; A. S. Knolles, borough surveyor, Municipal Offices.

Tynemouth. — Fire station (£40,000); borough engineer.

Warwickshire. — Residential nursery at Myton Hamlet, Warwick (£41,000); county architect, Warwick.

Watford. — Additional factory building; Scammell Lorries, Ltd., Tolpits Lane.

Crematorium, Garston (over £118,000); S. A. Nicholson, clerk to R.D.C., Wynyard House, Langley Road.

Worcestershire.—Secondary modern school at Brandhall, Oldbury, and ambulance station at Redditch; L. C. Lomas, county architect, 14, Castle Street, Worcester.